

KIC 004649440

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
004649440-01	OBS	3919.01	19.370718	147.668149	624.4	2.235	28.8	32.8	4.33	5321	22.14	459.90
004649440-02	OBS	No	19.370599	140.726846	221.8	6.594	12.8	14.0	4.33	5321	12.27	459.91

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004649440-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
004649440-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

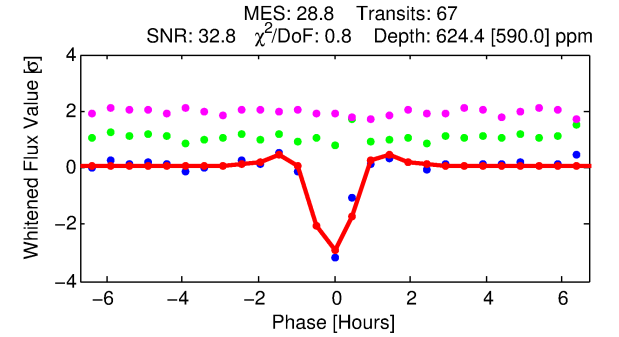
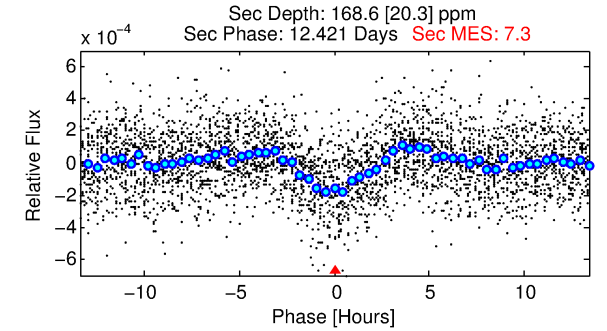
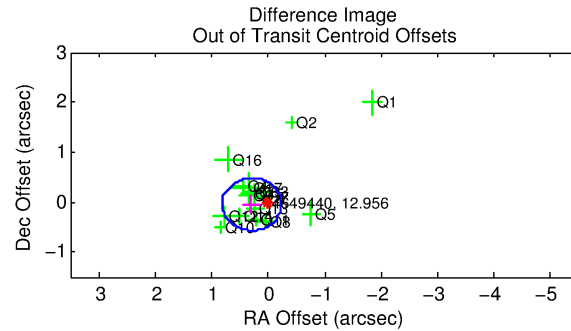
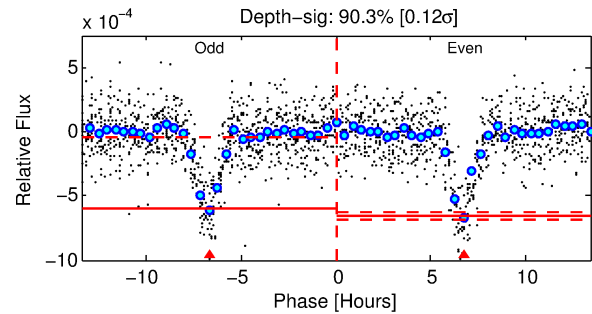
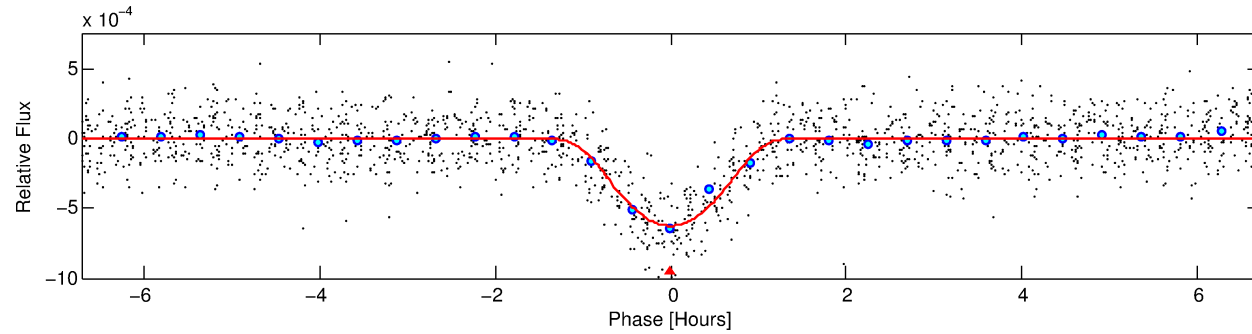
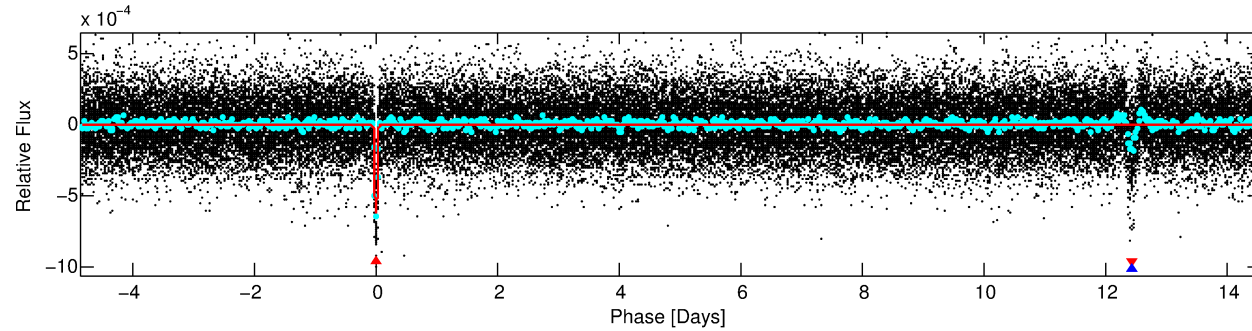
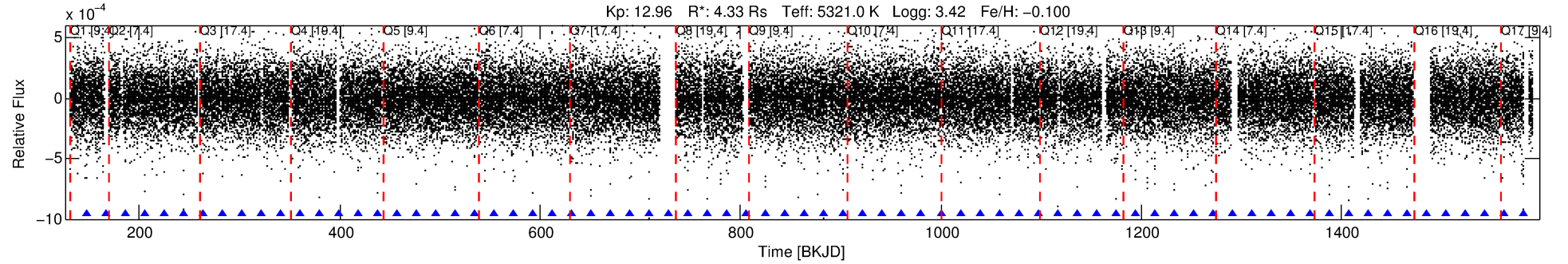
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004649440-01

No Significant Match Found

DV One-Page Summary

KIC: 4649440 Candidate: 1 of 2 Period: 19.371 d
KOI: K03919.01 Corr: 0.995



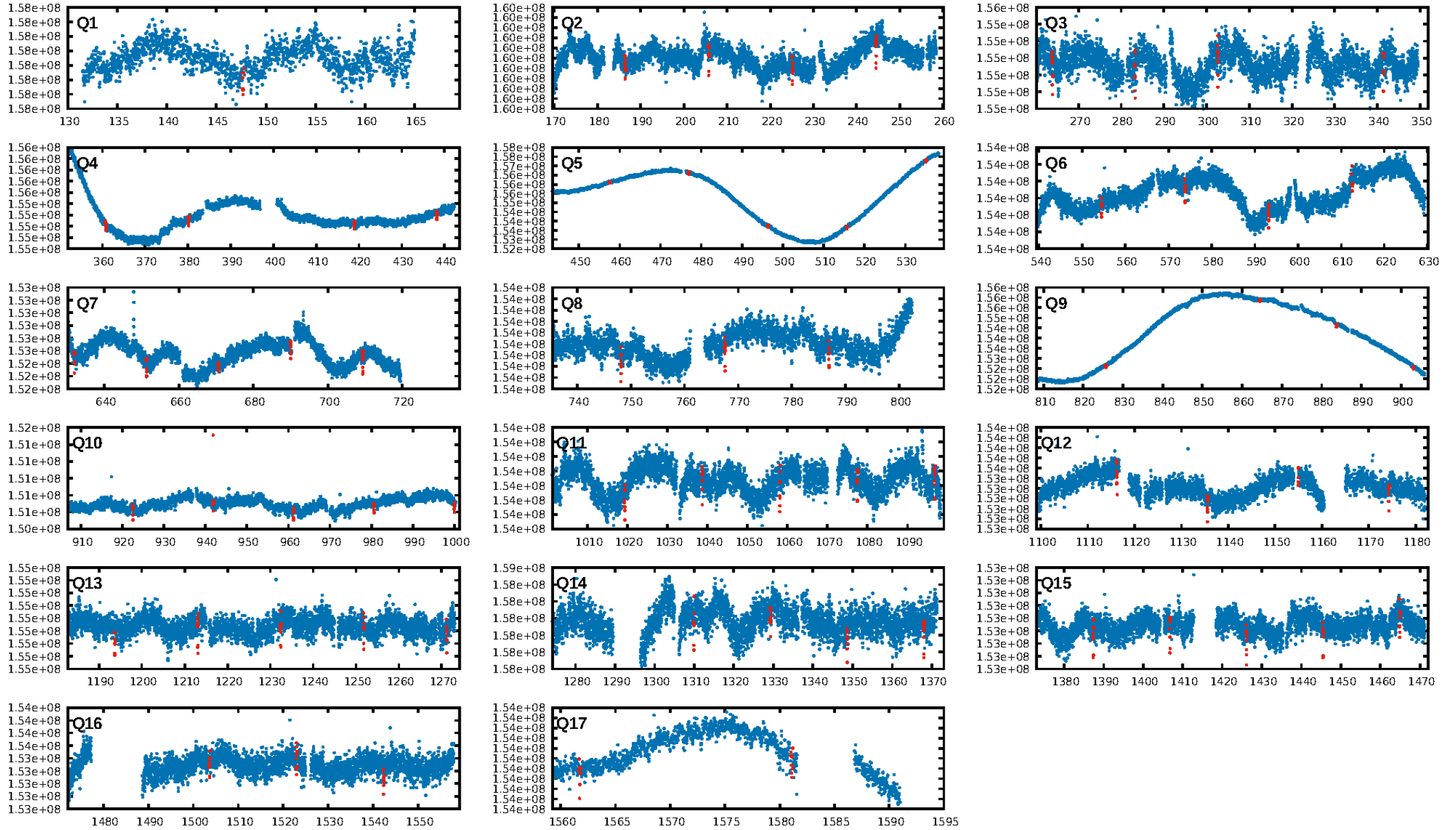
DV Fit Results:

Period = 19.37072 [0.00003] d
Epoch = 147.6681 [0.0014] BKJD
Rp/R* = 0.0468 [0.0547]
a/R* = 20.52 [5.90]
b = 1.00 [0.05]
Seff = 459.90 [225.56]
Teq = 1181 [145] K
Rp = 22.14 [27.14] Re
a = 0.1713 [0.0540] AU
Ag = 5.55 [13.24] [0.34 σ]
Teffp = 2803 [1643] K [0.98 σ]

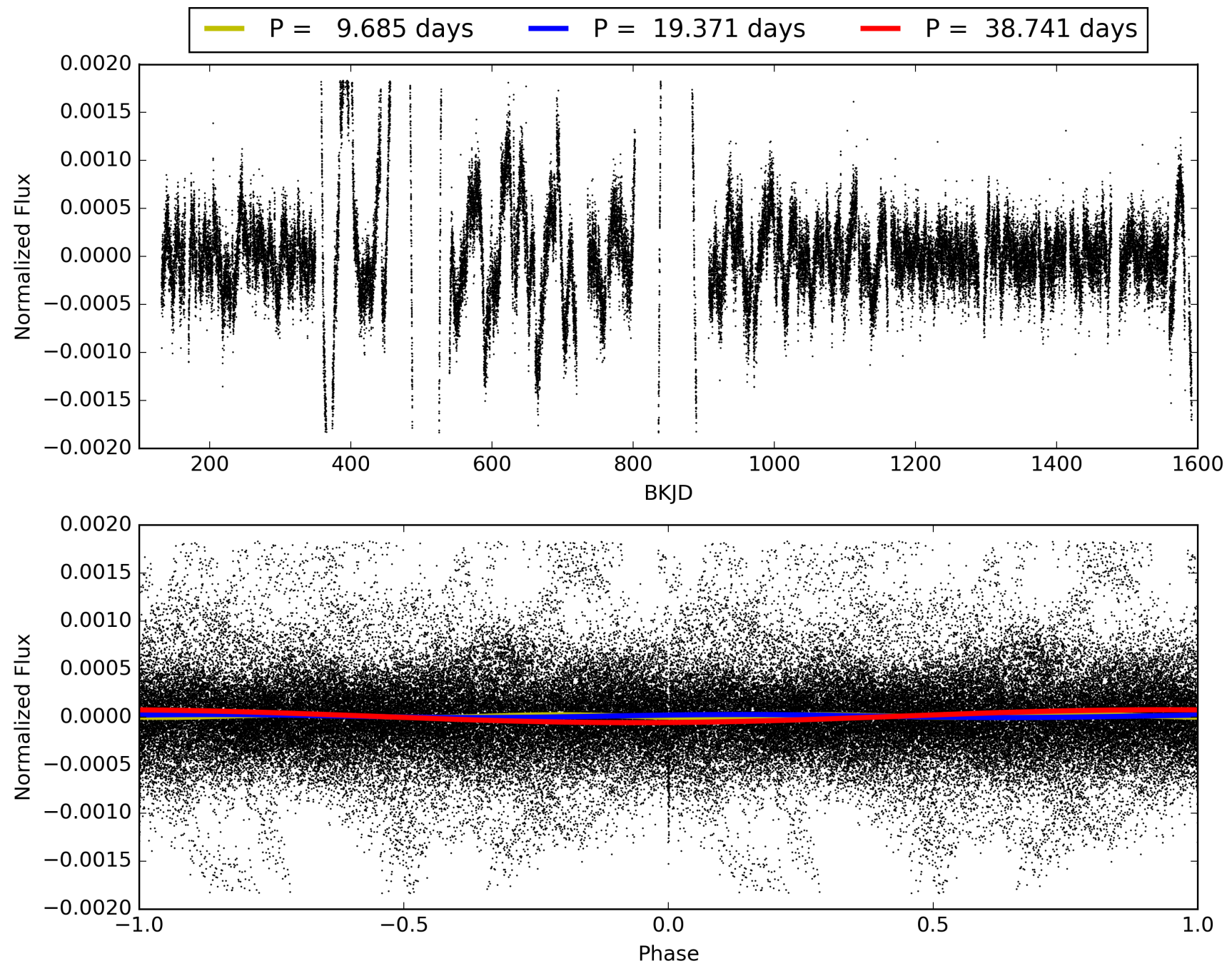
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 96.3%
ModelChiSquareGo-sig: 100.0%
Bootstrap-pfa: 3.09e-157
RollingBand-fgt: 1.00 [64/64]
GhostDiagnostic-chr: 4.451
Centroid-sig: N/A
Centroid-so: 0.186 arcsec [1.08 σ]
OotOffset-rm: 0.296 arcsec [1.70 σ]
KicOffset-rm: 0.263 arcsec [1.67 σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 004649440-01, PDC Light Curves

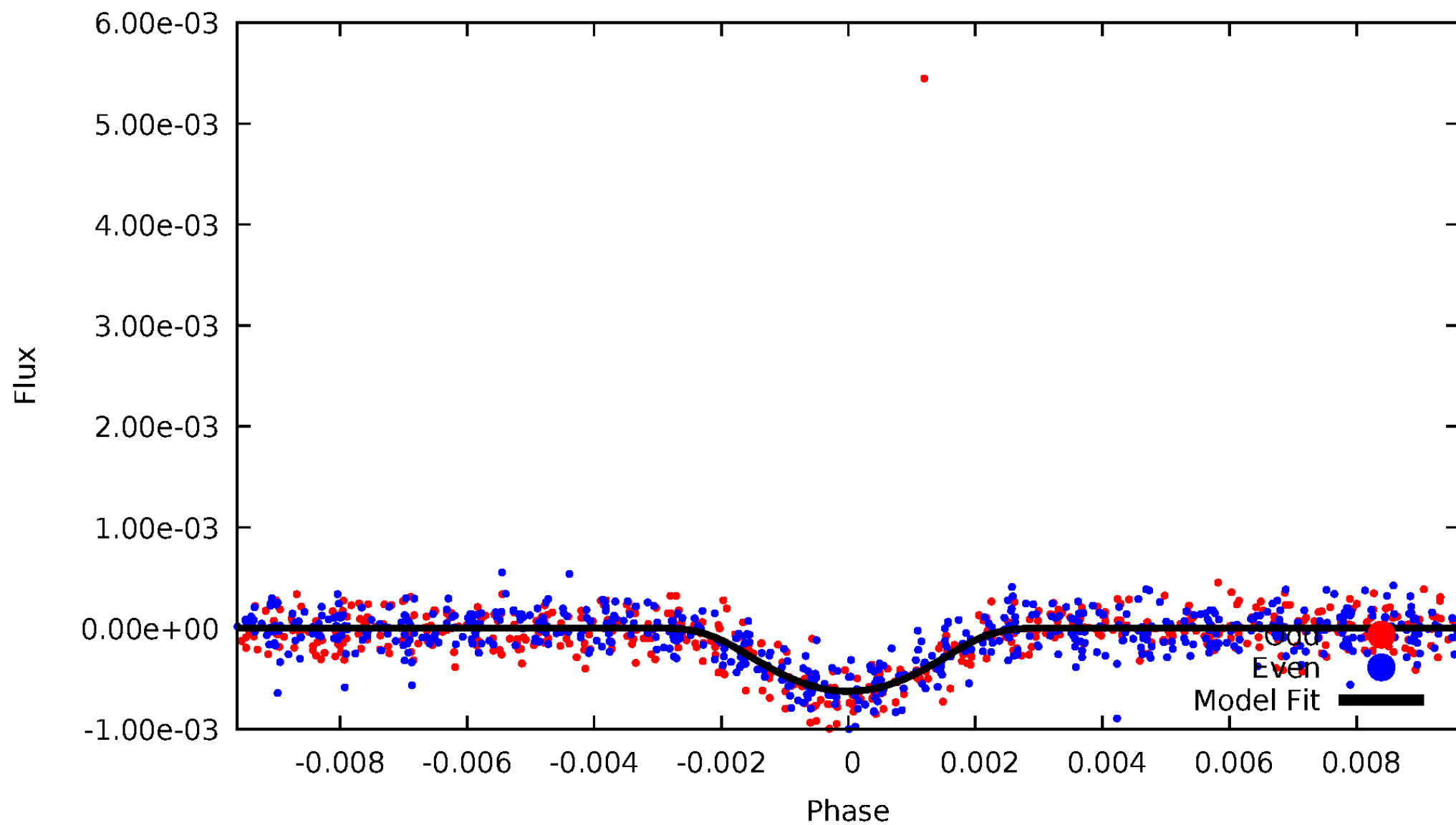


TCE 004649440-01



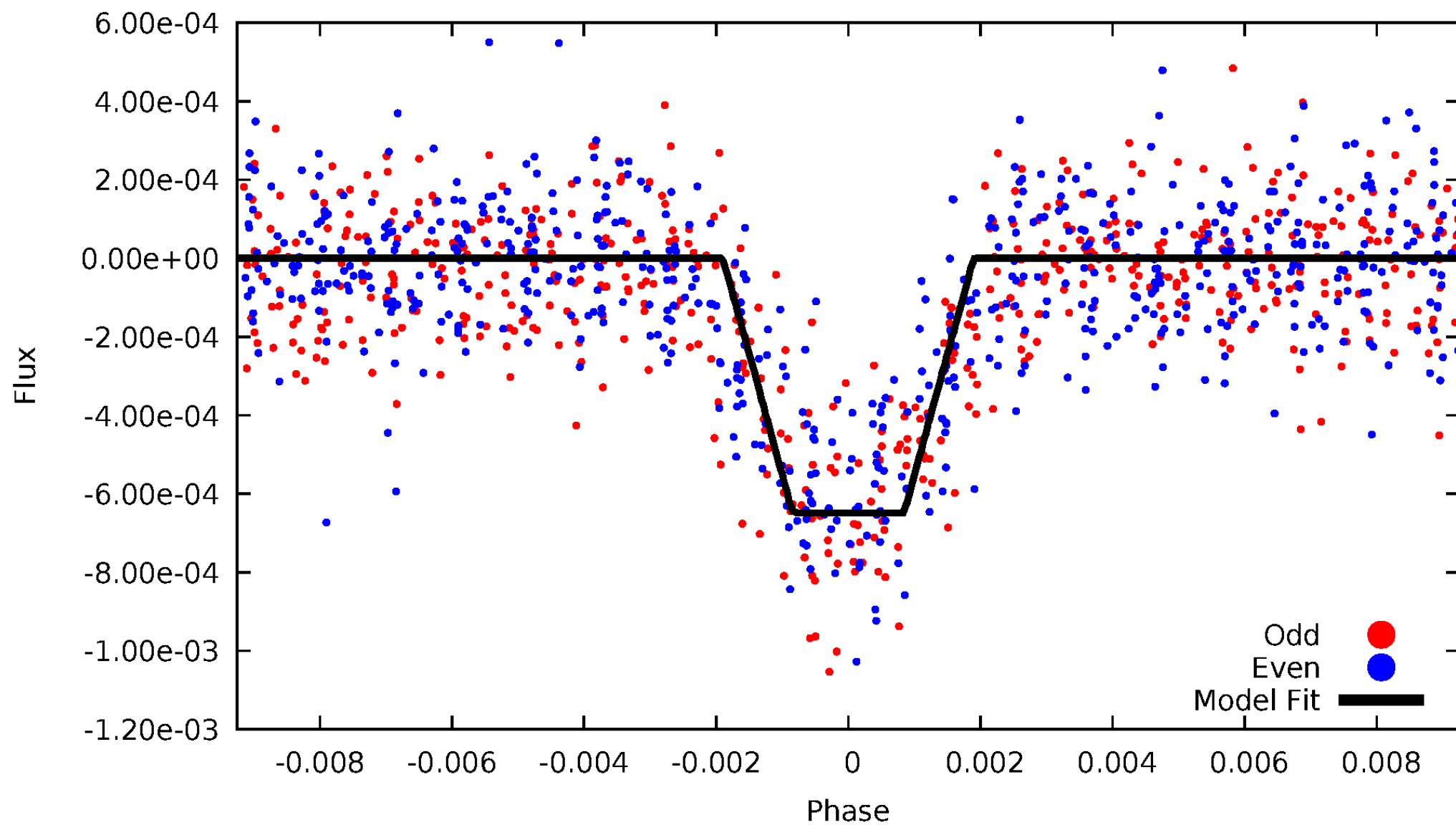
DV Odd/Even

TCE 004649440-01

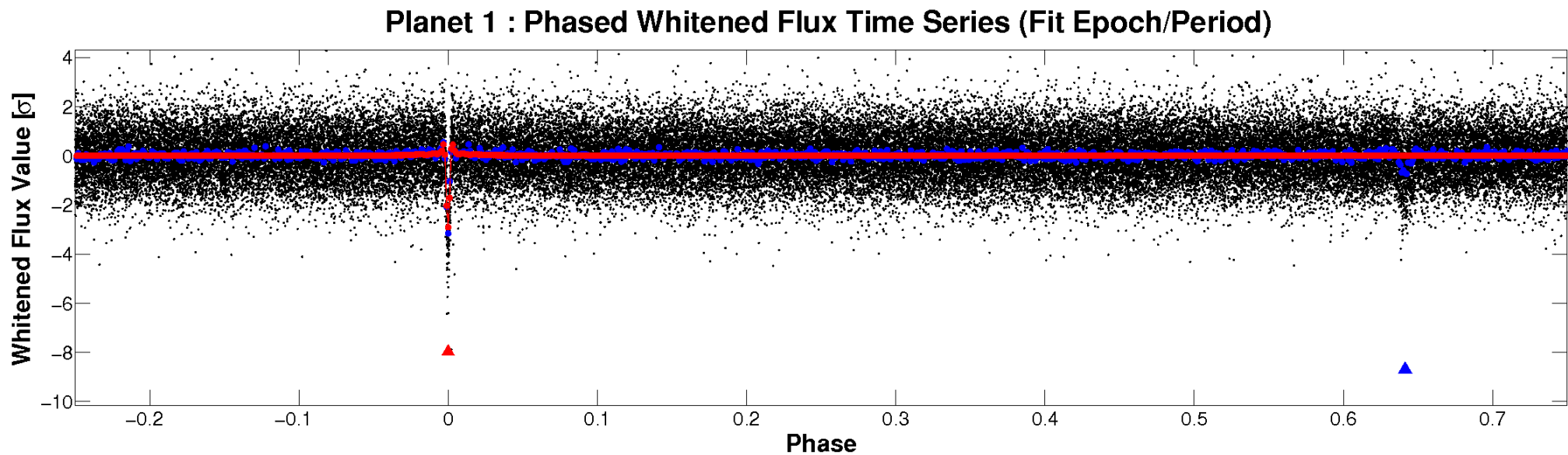
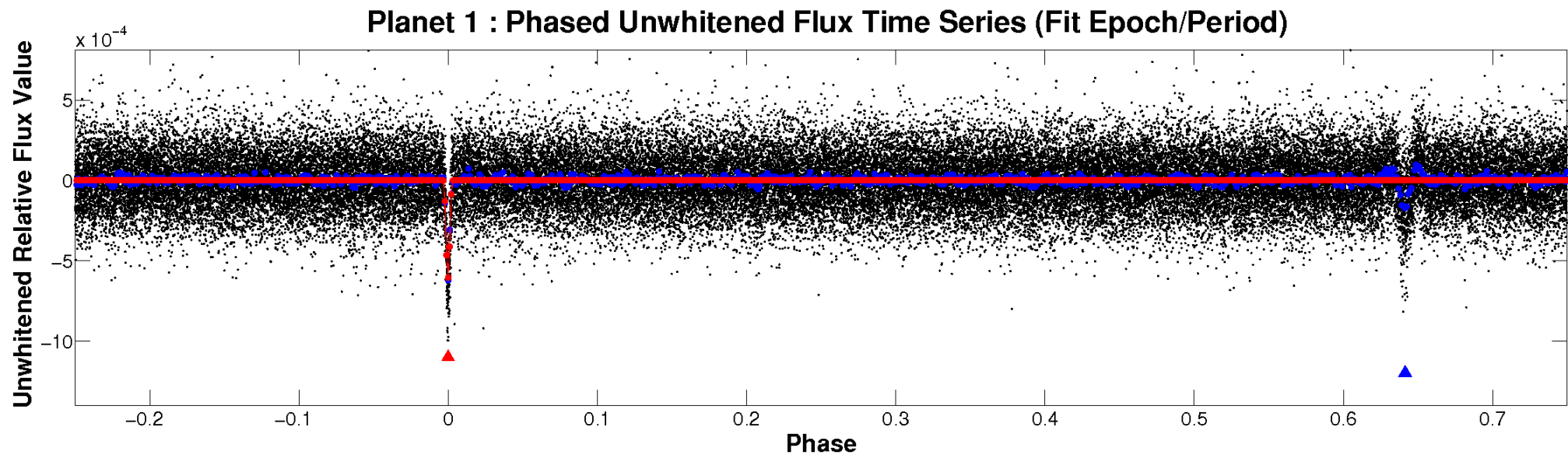


ALT Odd/Even

TCE 004649440-01

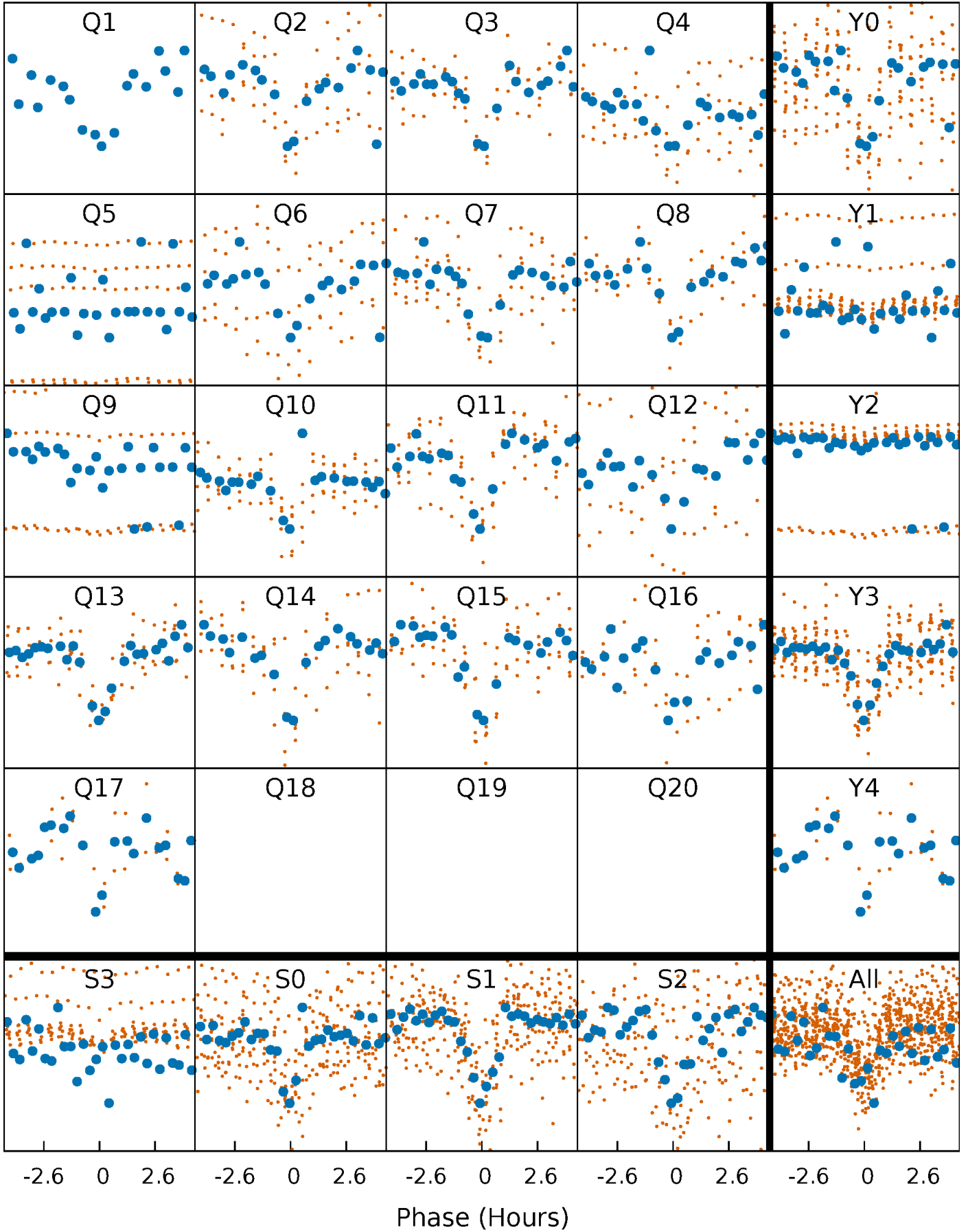


Non-Whitened Vs. Whitened Light Curve



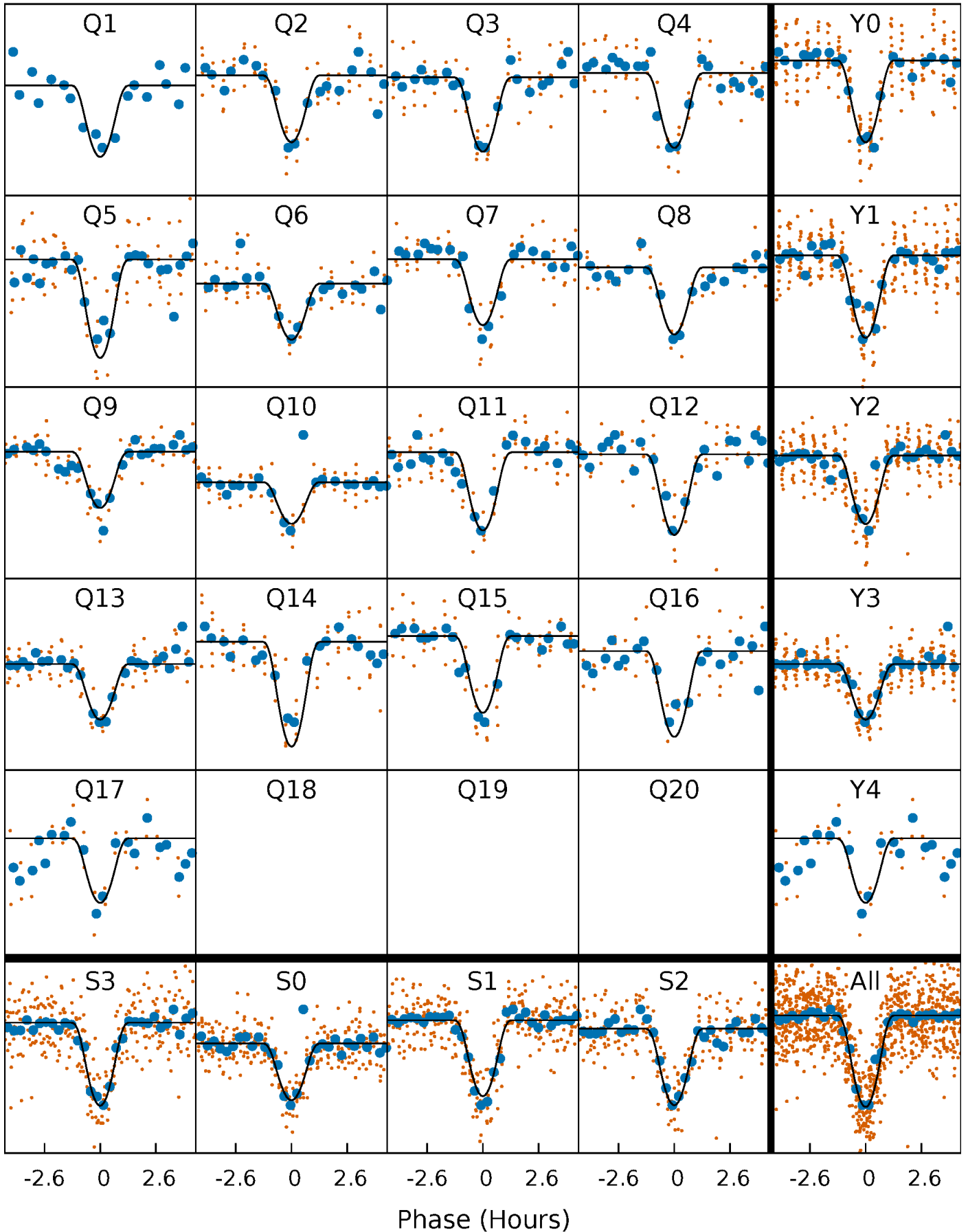
PDC Quarter-Phased Transit Curves

TCE 004649440-01 P= 19.370718 Days $T_0=147.668149$ (BKJD)



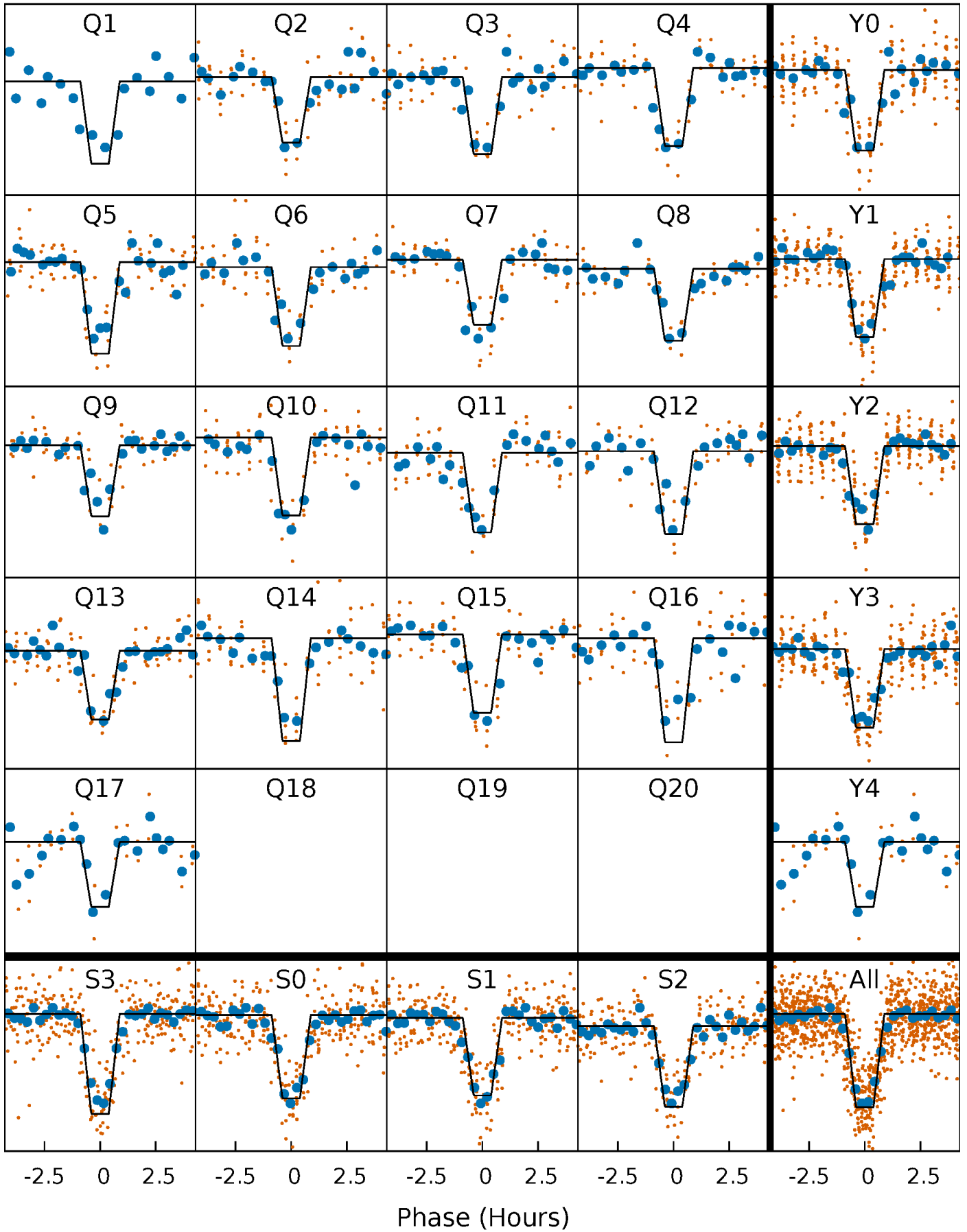
DV Quarter-Phased Transit Curves

TCE 004649440-01 P= 19.370718 Days $T_0=147.668149$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

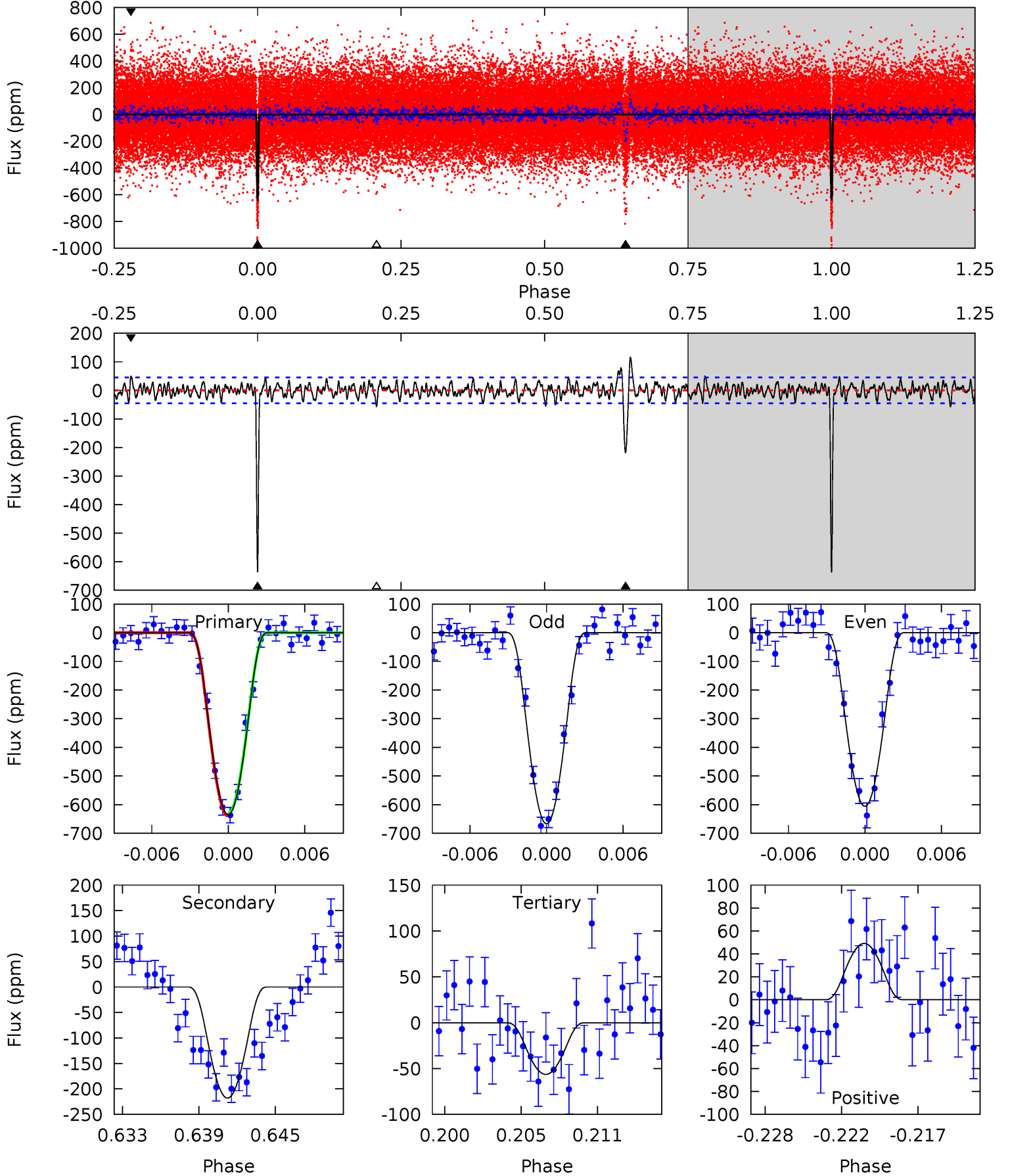
TCE 004649440-01 P= 19.370714 Days $T_0=147.668023$ (BKJD)



DV Model-Shift Uniqueness Test

004649440-01, P = 19.370718 Days, E = 128.297431 Days

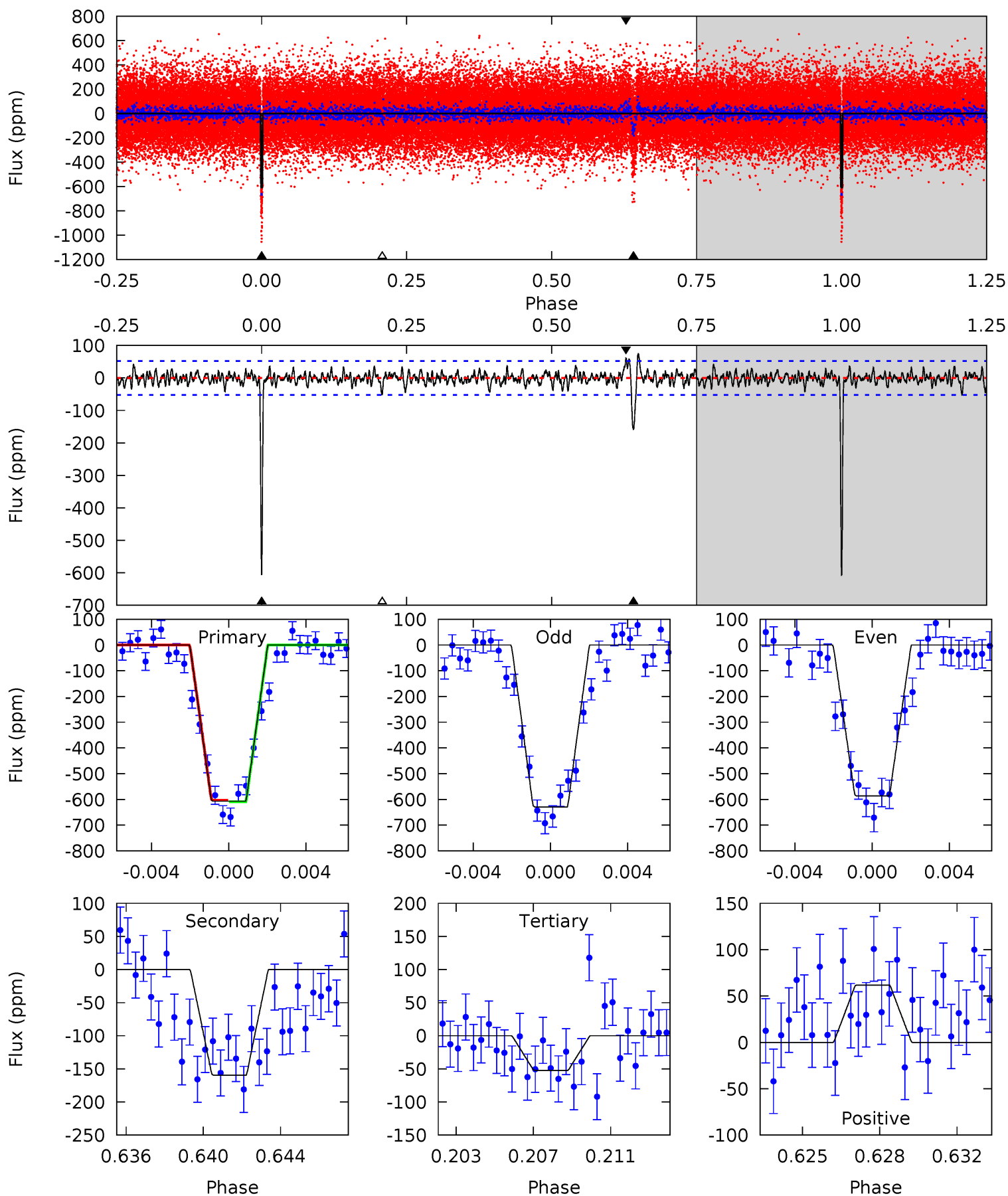
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
72.2	24.8	6.41	5.58	5.13	2.76	2.25	65.8	66.6	18.4	19.2	3.48	0.95	0.15	0.58



Alt Model-Shift Uniqueness Test

004649440-01, $P = 19.370714$ Days, $E = 128.297309$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
60.6	15.9	5.22	6.17	5.21	2.90	1.54	55.4	54.4	10.7	9.76	2.14	1.02	0.11	0.29



Stellar Parameters For KIC 004649440

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5321^{+130}_{-223}	$3.416^{+0.253}_{-0.136}$	$-0.100^{+0.200}_{-0.350}$	$4.335^{+0.692}_{-1.614}$	$1.783^{+0.177}_{-0.708}$	$0.031^{+0.054}_{-0.011}$
	+2%/-4%	+7%/-4%	+200%/-350%	+16%/-37%	+10%/-40%	+176%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 004649440-01 / KOI 3919.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-218 ± 9	$28.73^{+22.59}_{-17.84}$	1627^{+101}_{-131}	3103^{+1162}_{-495}	$4.052^{+23.357}_{-2.684}$
Alt.	-160 ± 10	$21.58^{+19.79}_{-14.35}$	1631^{+106}_{-138}	3228^{+1557}_{-595}	$5.250^{+39.053}_{-3.745}$

T_{max} = Theoretical Maximum Planetary Temperature
 T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)
 A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

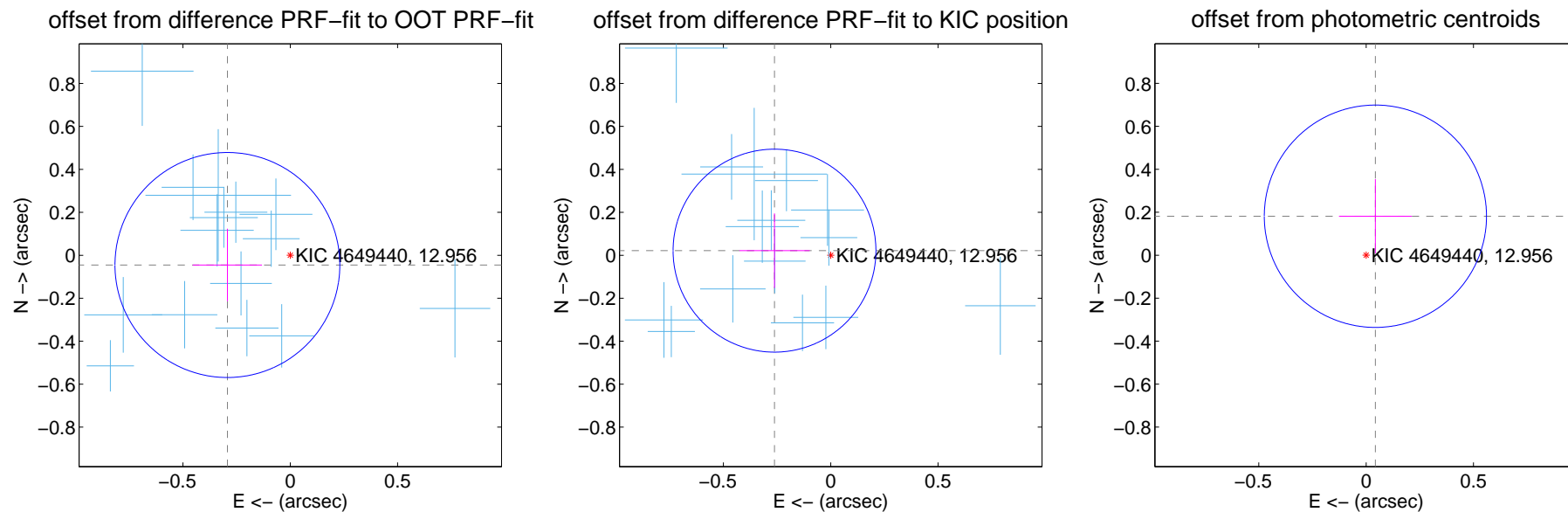
DV Centroid Data

Supplemental centroid analysis for 004649440-01. Kepler magnitude: 12.96. Transit SNR 32.76

There are 17 quarters with good PRF difference image offsets

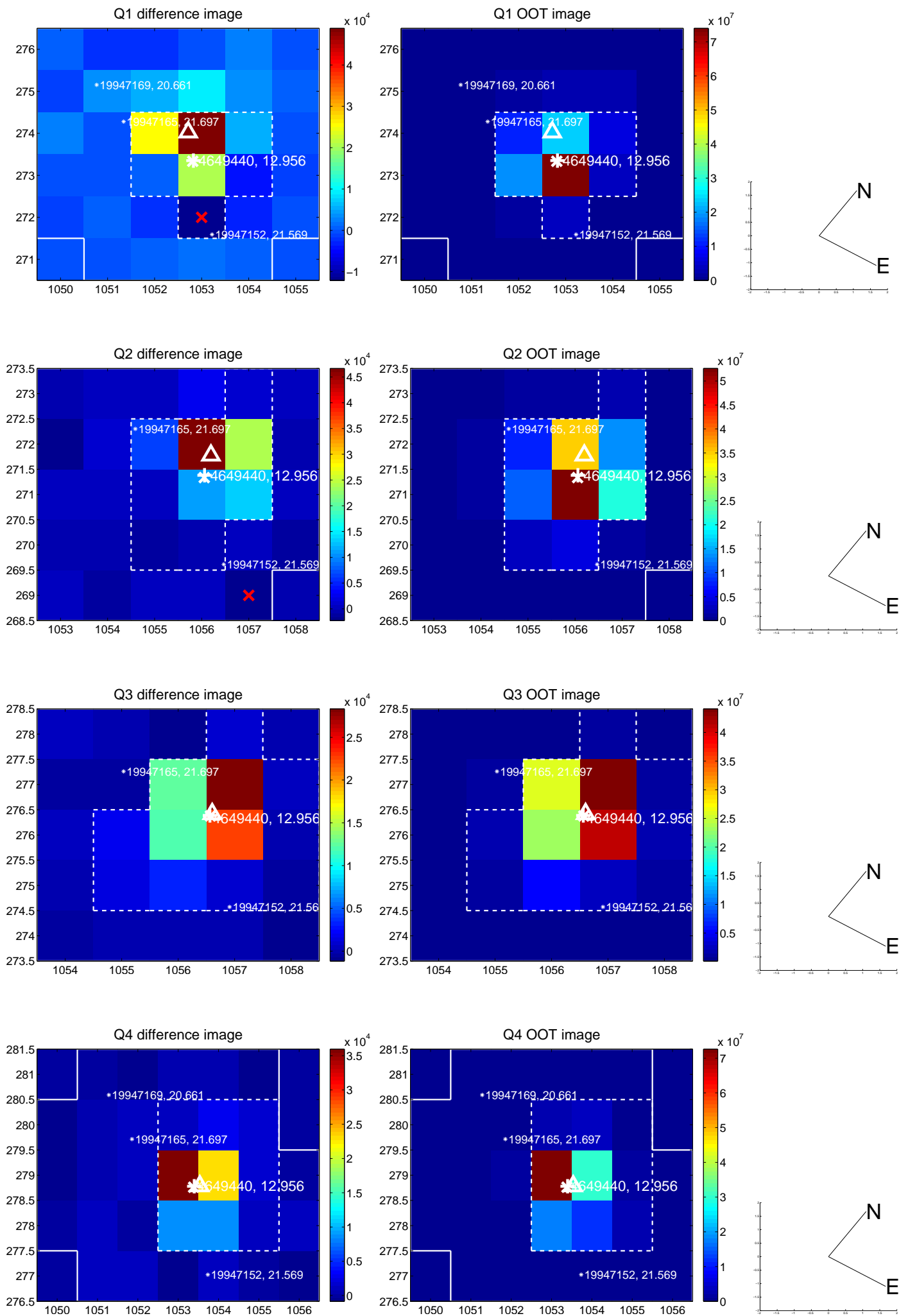
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.296 ± 0.175	1.70	0.293 ± 0.161	-0.045 ± 0.169
PRF-fit source offset from KIC position	0.263 ± 0.157	1.67	0.262 ± 0.164	0.022 ± 0.174
photometric centroid source offset	0.19 ± 0.17	1.08	-0.04 ± 0.17	0.18 ± 0.17

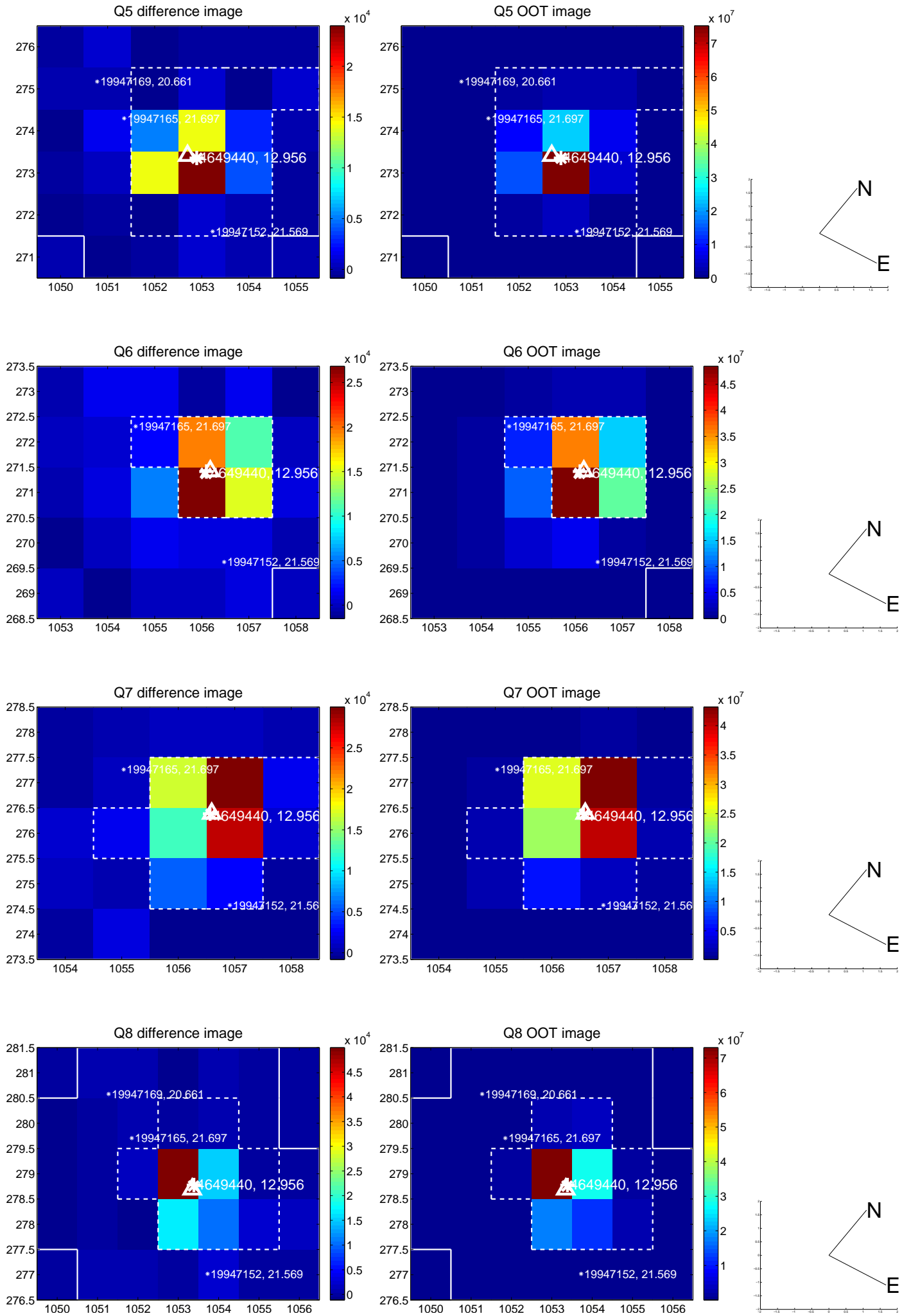


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

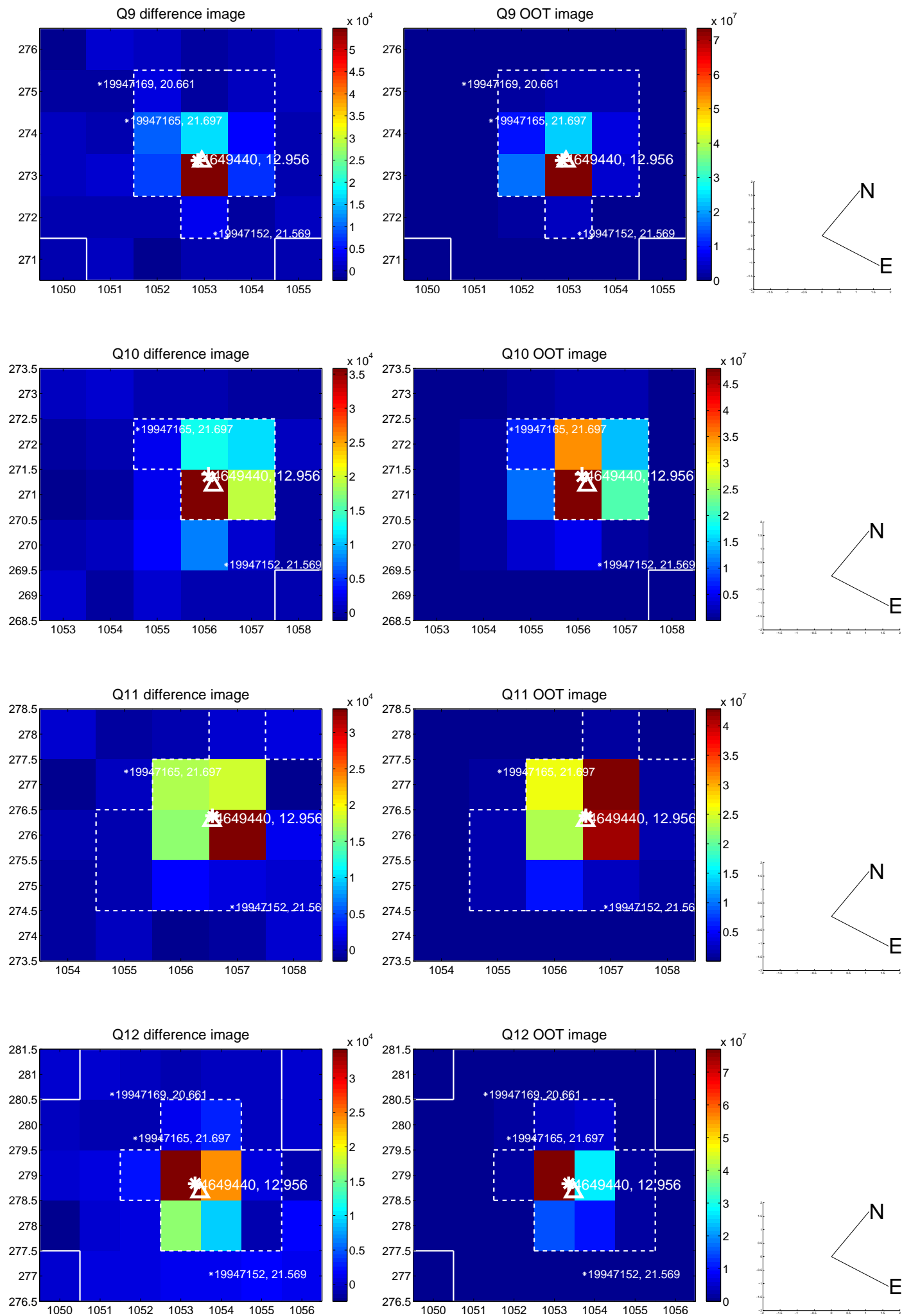
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



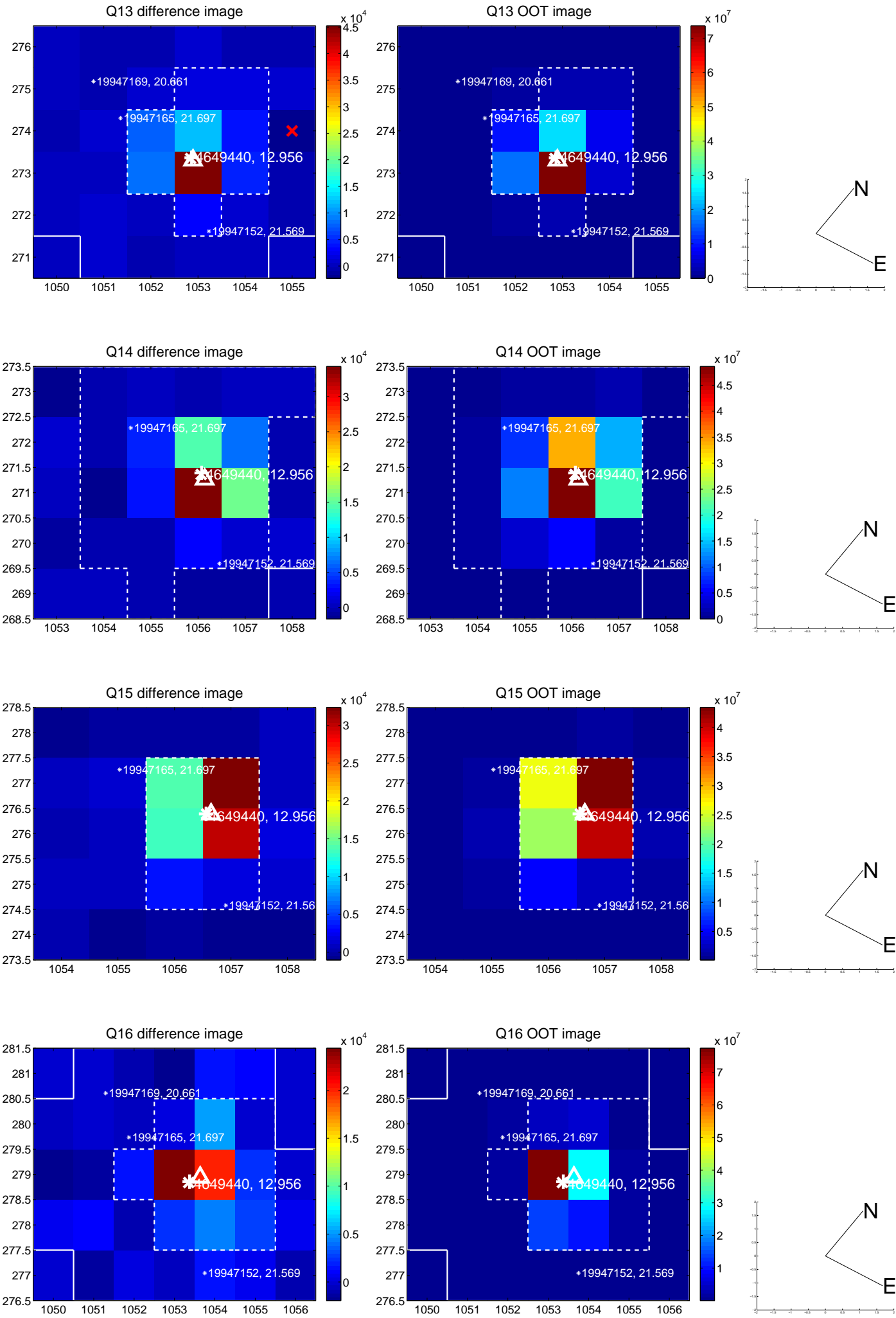
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



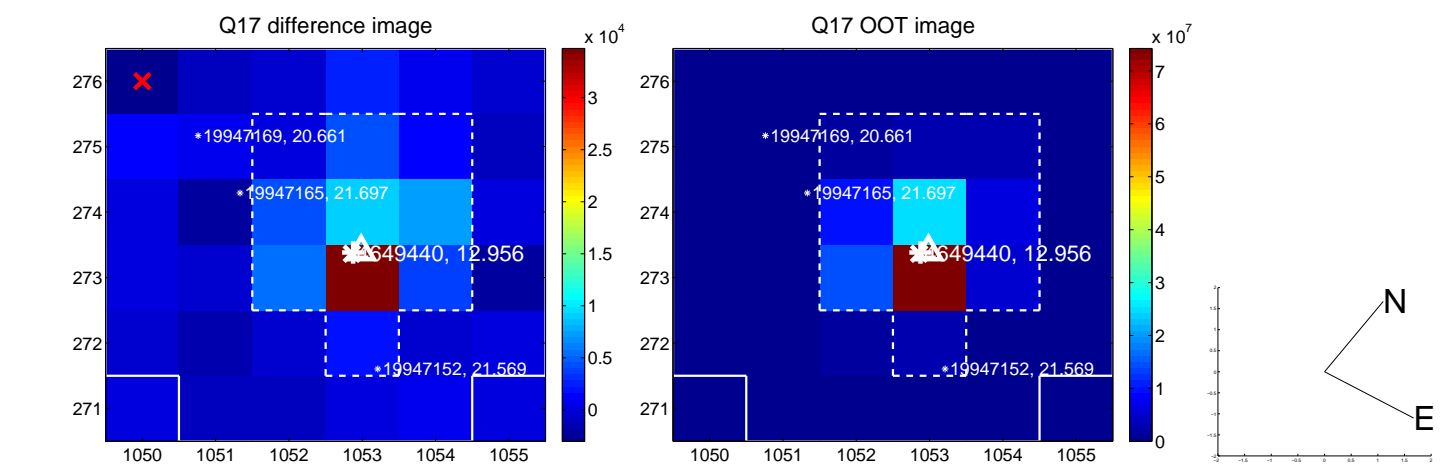
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



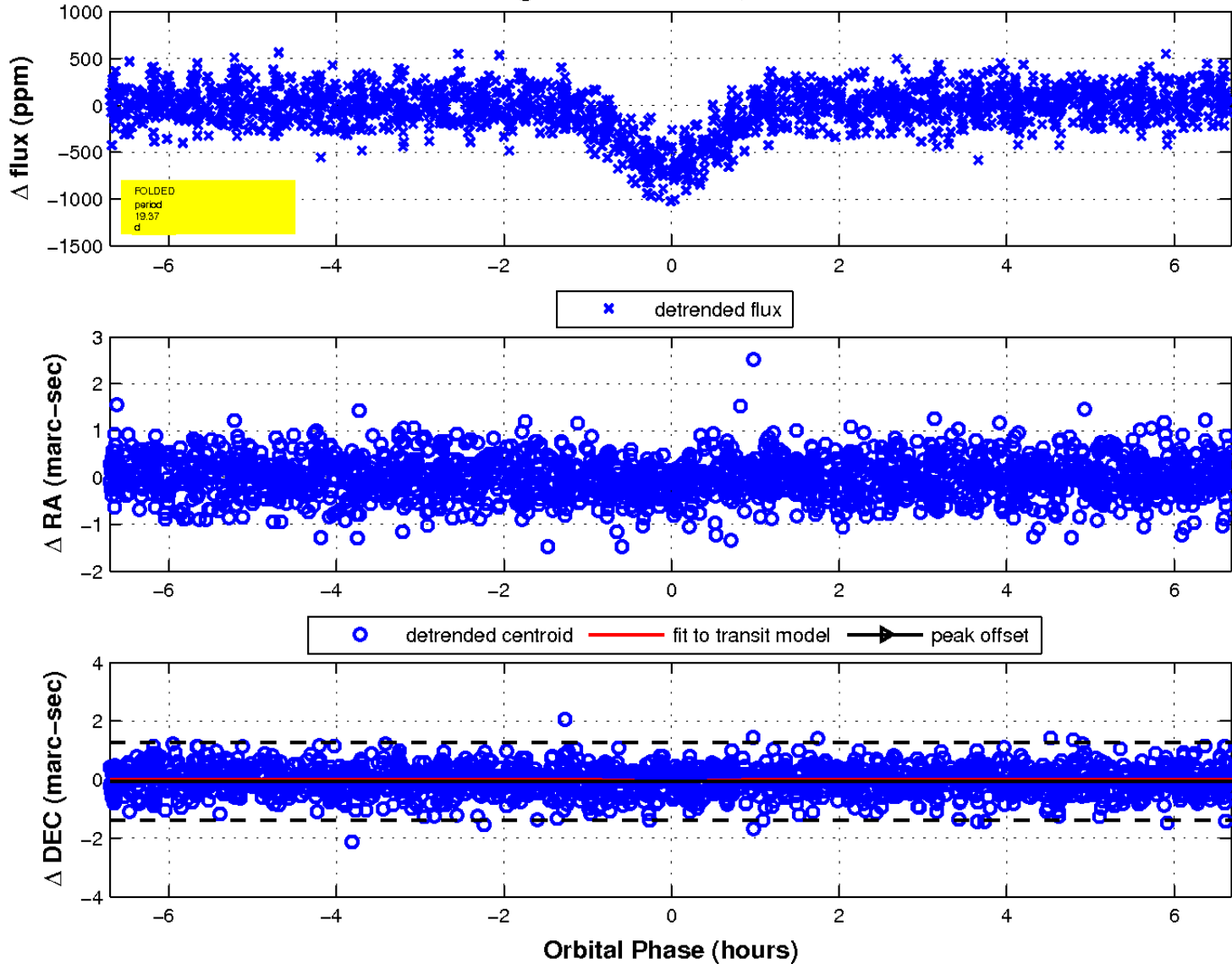
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

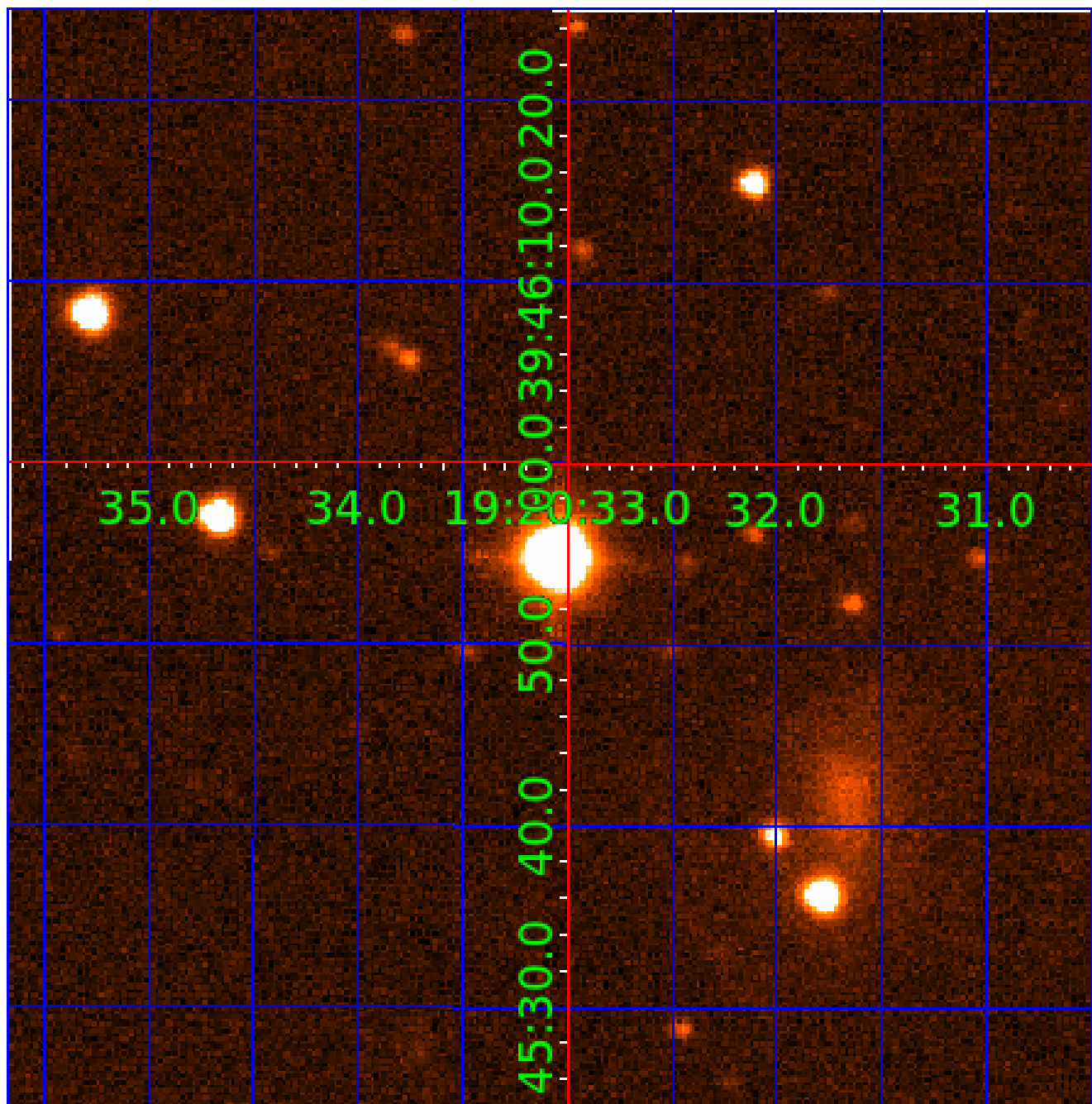


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 004649440

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
004649440-01	OBS	3919.01	19.370718	147.668149	624.4	2.235	28.8	32.8	4.33	5321	22.14	459.90
004649440-02	OBS	No	19.370599	140.726846	221.8	6.594	12.8	14.0	4.33	5321	12.27	459.91

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004649440-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
004649440-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

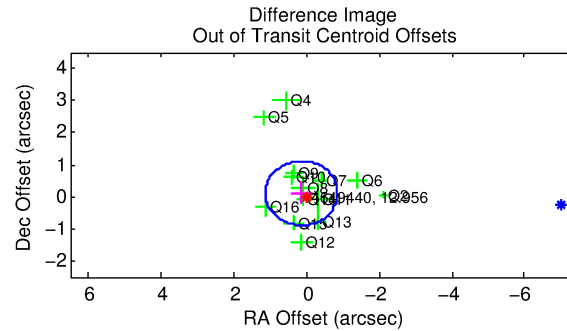
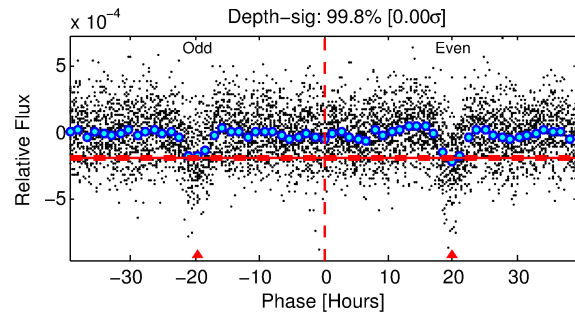
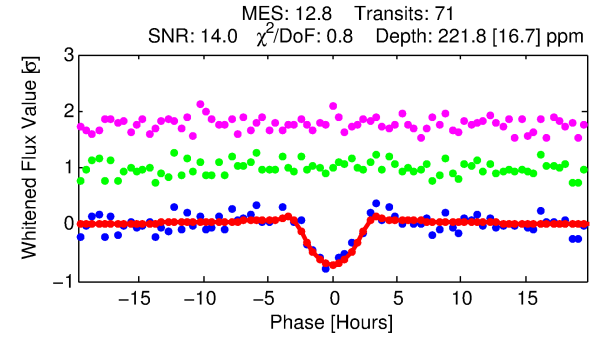
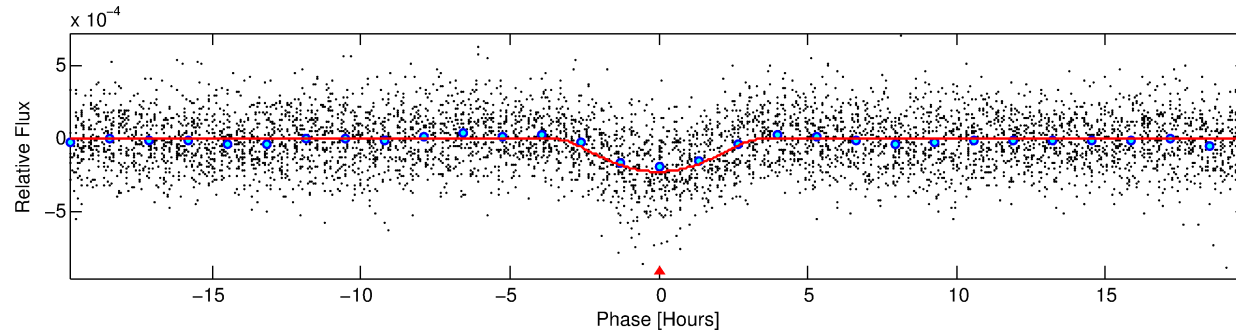
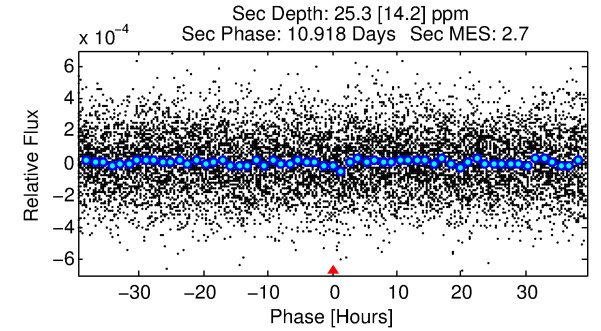
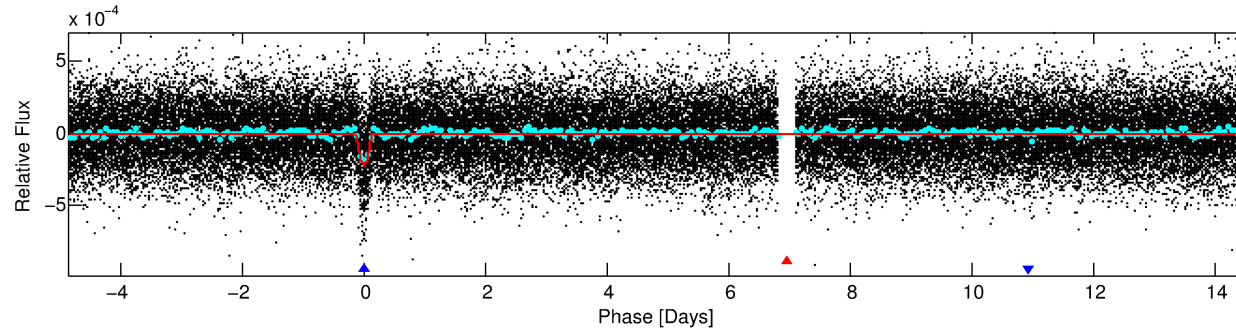
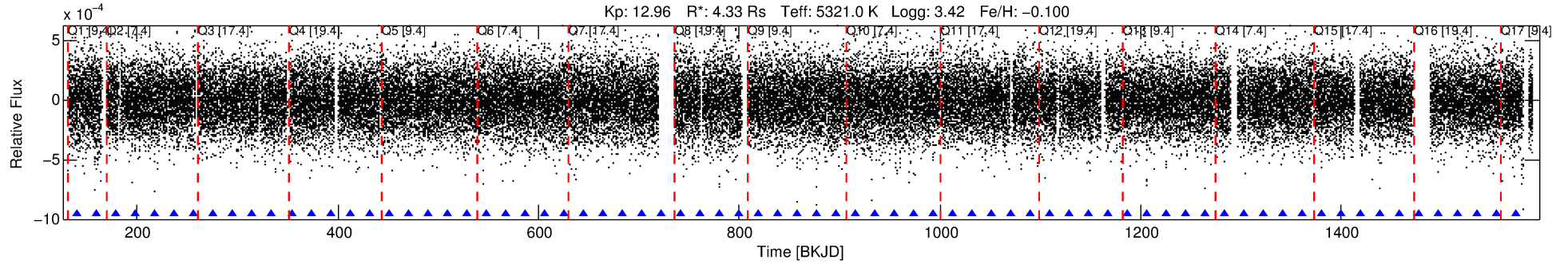
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004649440-02

No Significant Match Found

DV One-Page Summary

KIC: 4649440 Candidate: 2 of 2 Period: 19.371 d
KOI: K03919 Corr: No Ephemeris Match



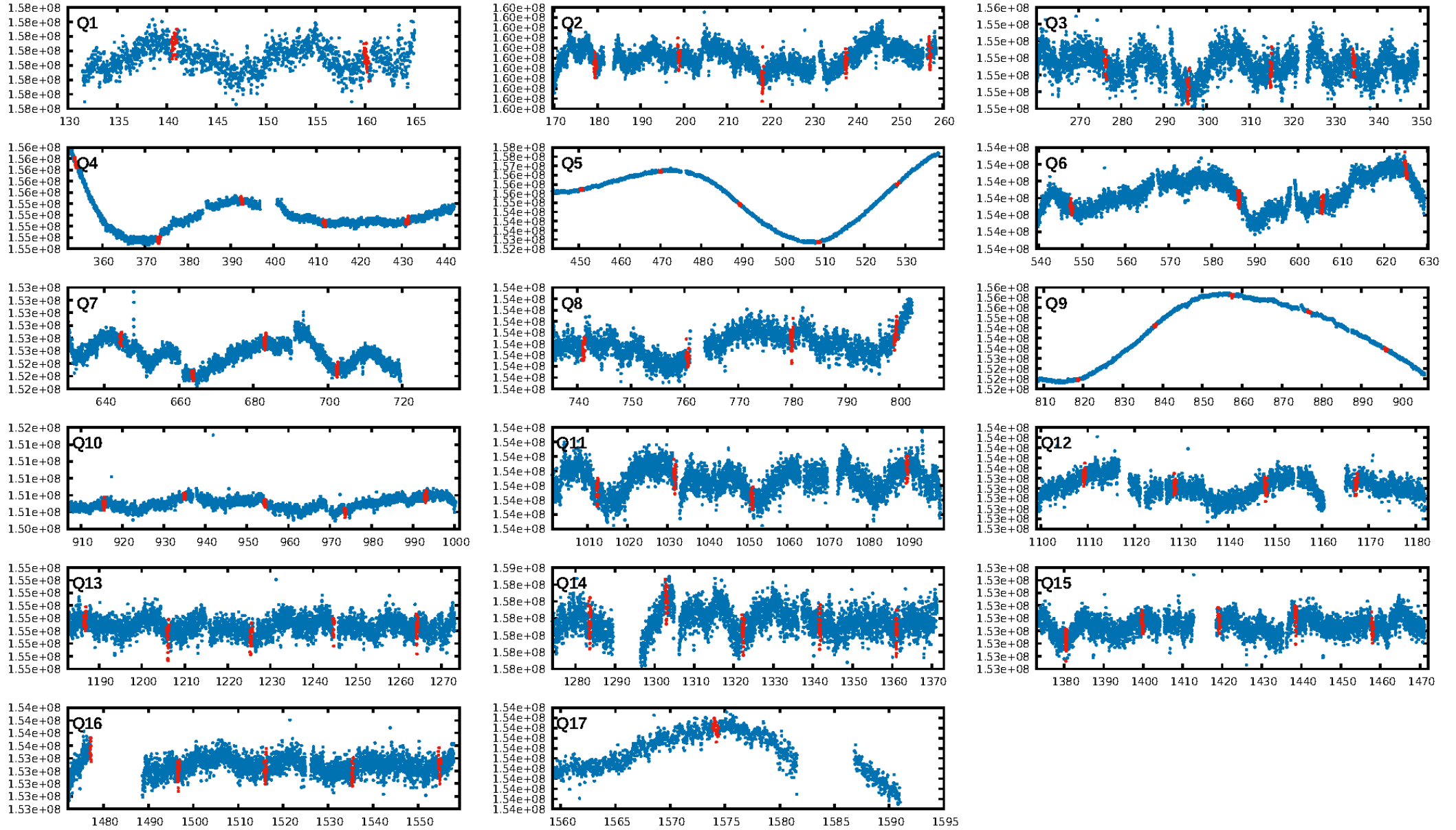
DV Fit Results:

Period = 19.37060 [0.00021] d
Epoch = 140.7268 [0.0090] BKJD
Rp/R* = 0.0259 [0.0270]
a/R* = 5.62 [1.67]
b = 1.00 [0.04]
Seff = 459.91 [225.56]
Teq = 1181 [145] K
Rp = 12.27 [13.57] Re
a = 0.1713 [0.0540] AU
Ag = 2.72 [5.99] [0.29σ]
Teffp = 2344 [1267] K [0.91σ]

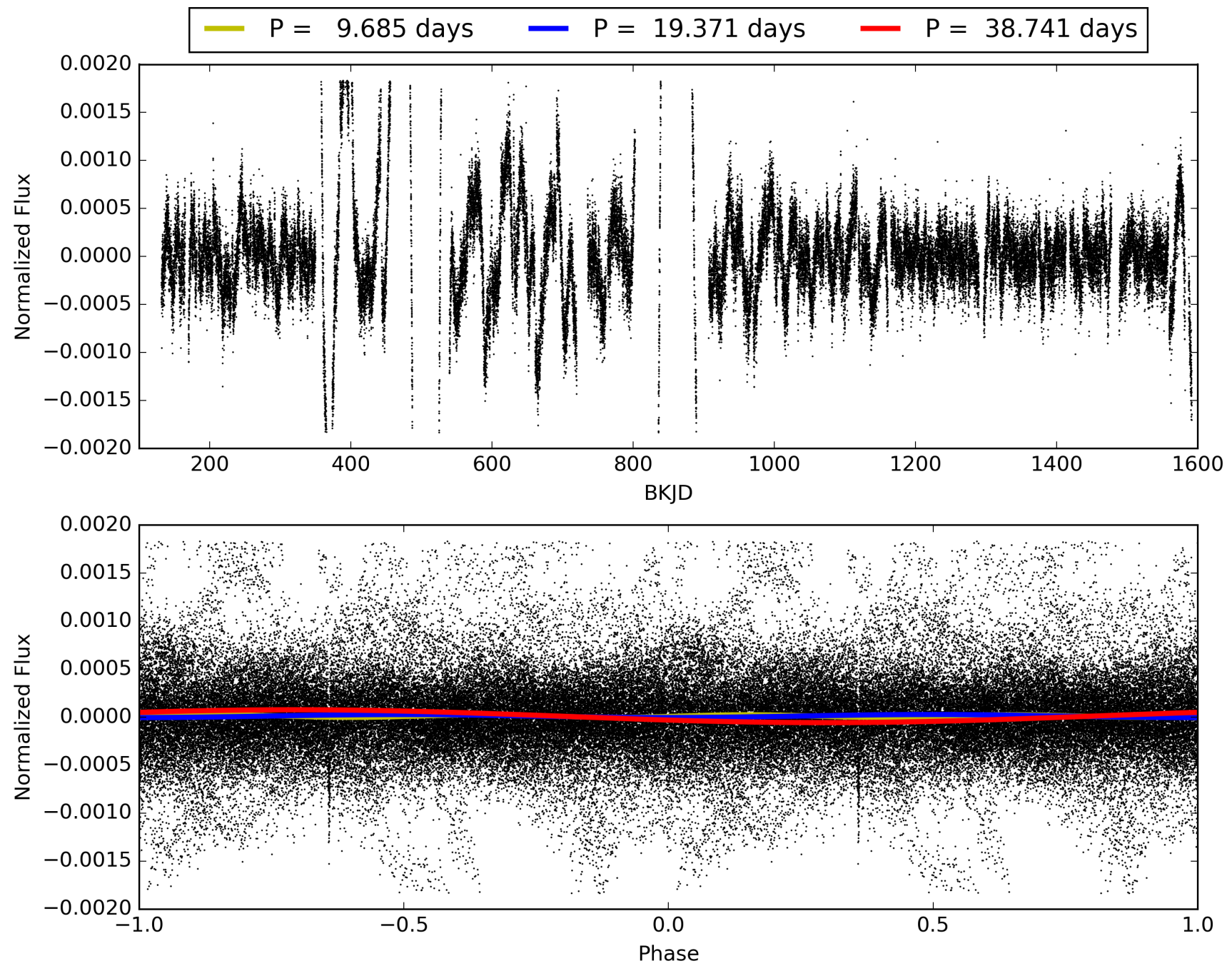
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 25.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 6.18e-34
RollingBand-fgt: 1.00 [68/68]
GhostDiagnostic-chr: 2.443
Centroid-sig: N/A
Centroid-so: 0.425 arcsec [1.47σ]
OotOffset-rm: 0.179 arcsec [0.54σ]
KicOffset-rm: 0.242 arcsec [0.77σ]
OotOffset-st: 4/3/4/3 [14]
KicOffset-st: 4/3/4/3 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 004649440-02, PDC Light Curves

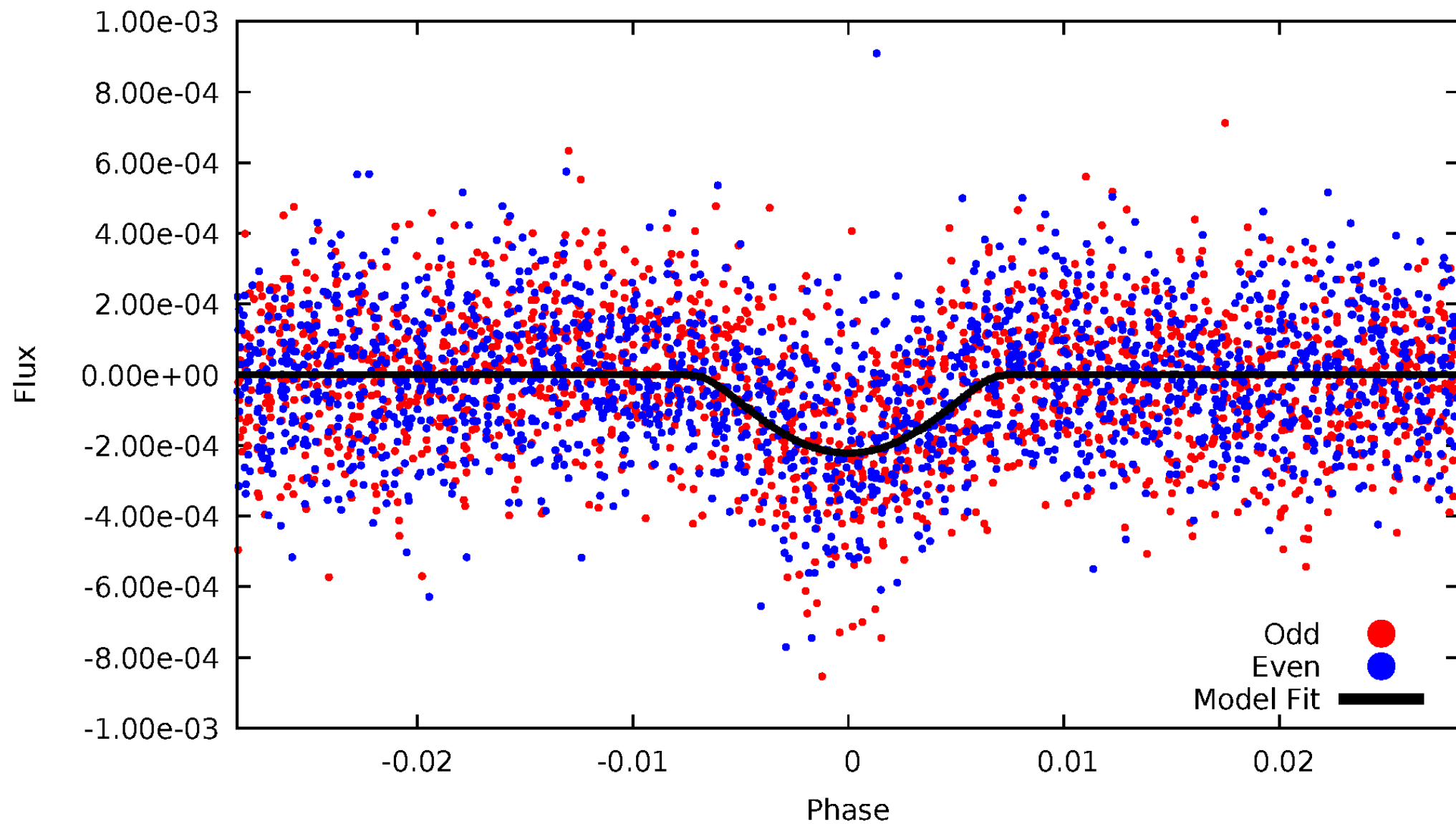


TCE 004649440-02



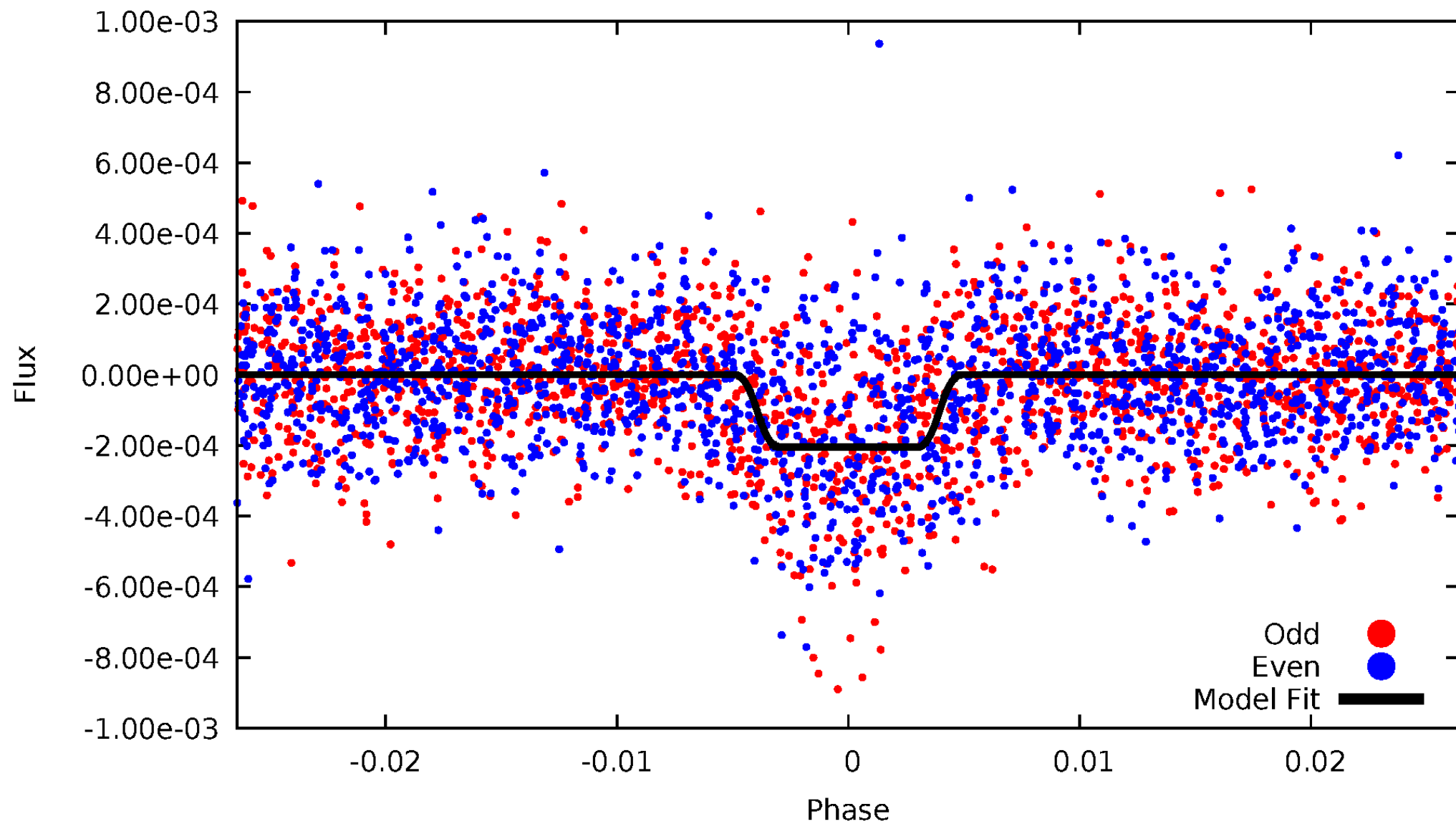
DV Odd/Even

TCE 004649440-02



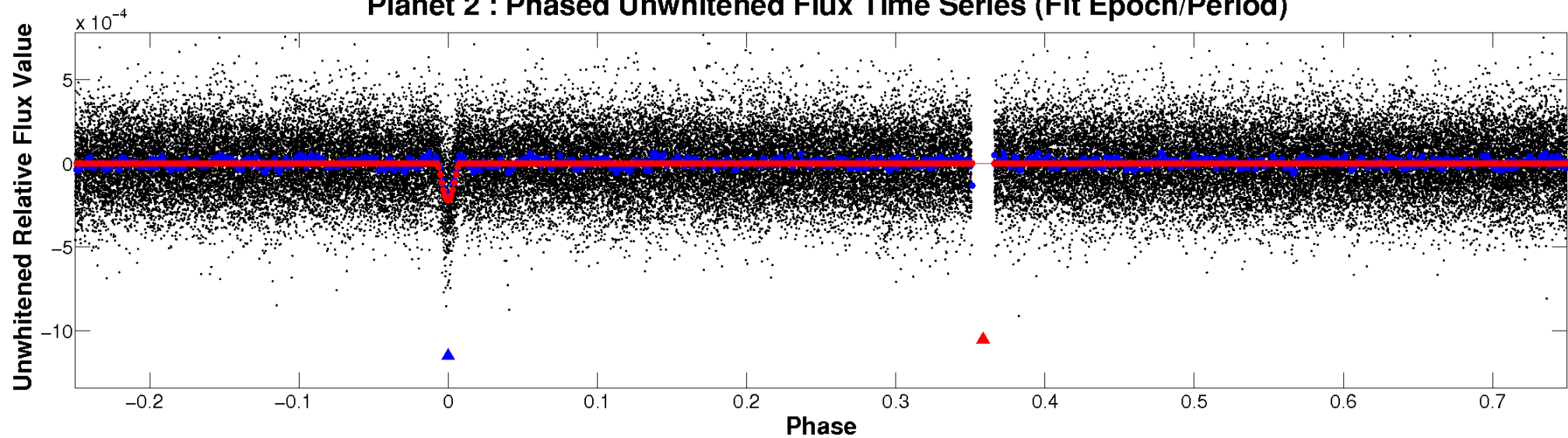
ALT Odd/Even

TCE 004649440-02

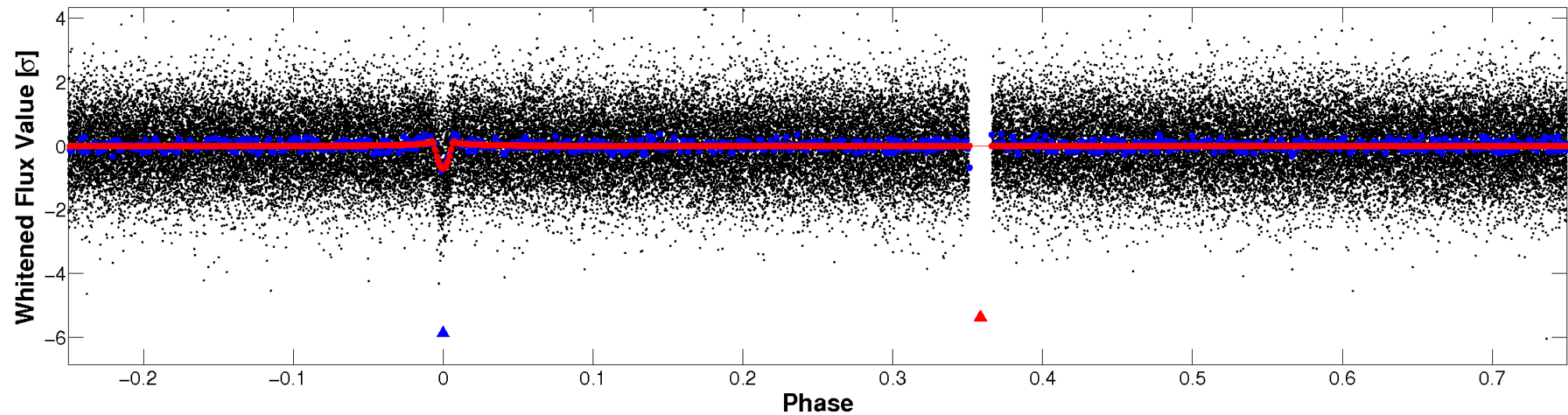


Non-Whitened Vs. Whitened Light Curve

Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

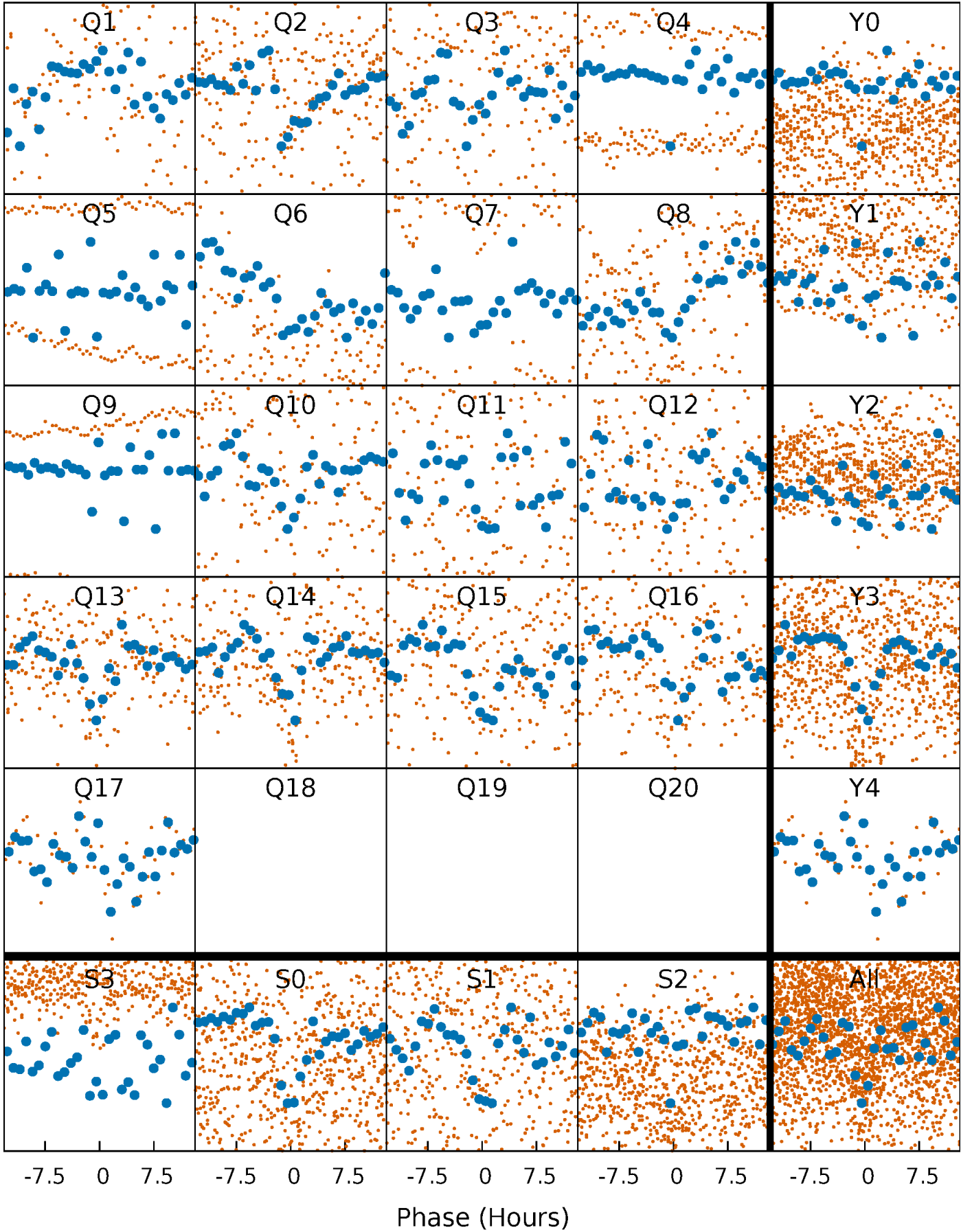


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



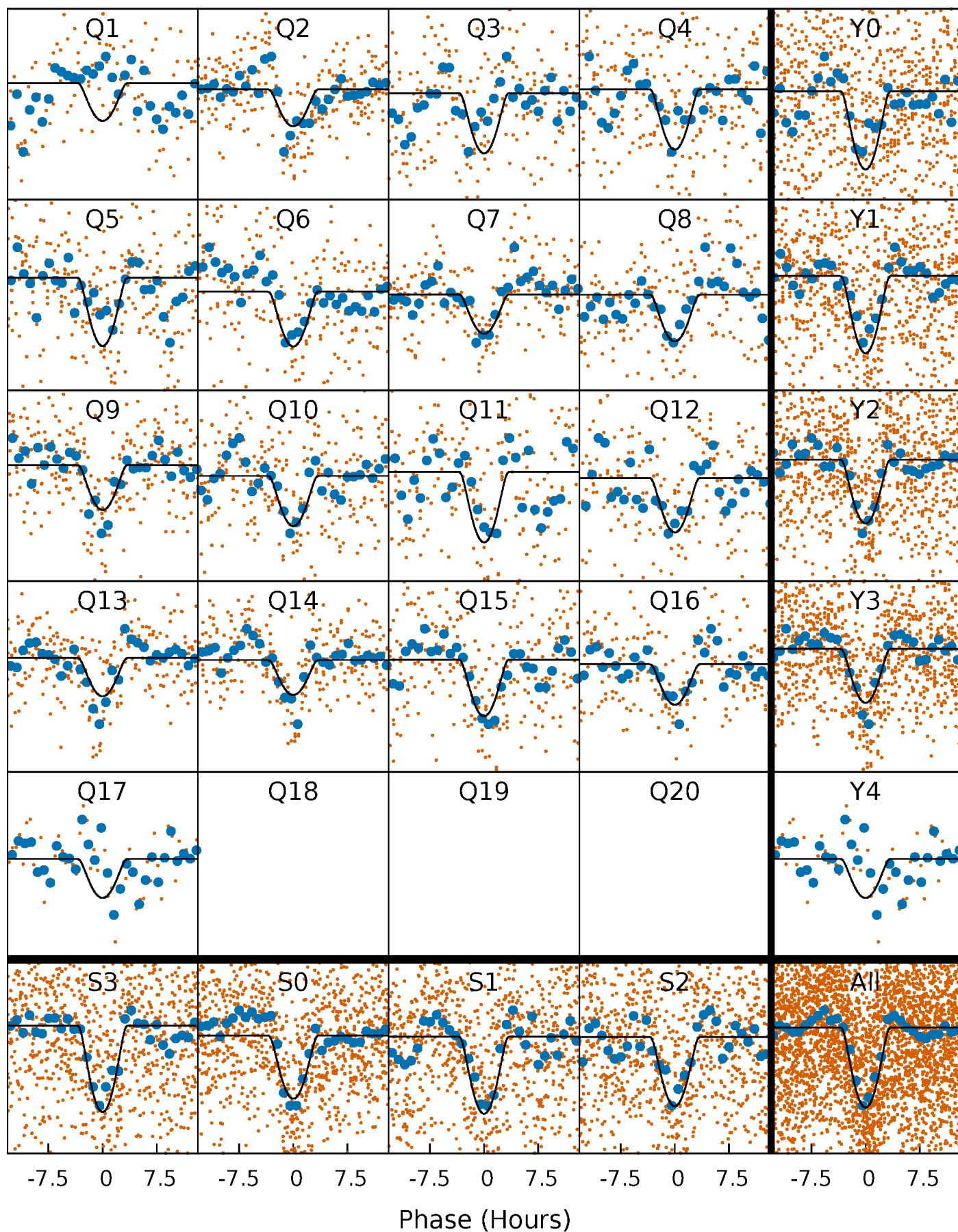
PDC Quarter-Phased Transit Curves

TCE 004649440-02 P= 19.370599 Days $T_0=140.726846$ (BKJD)



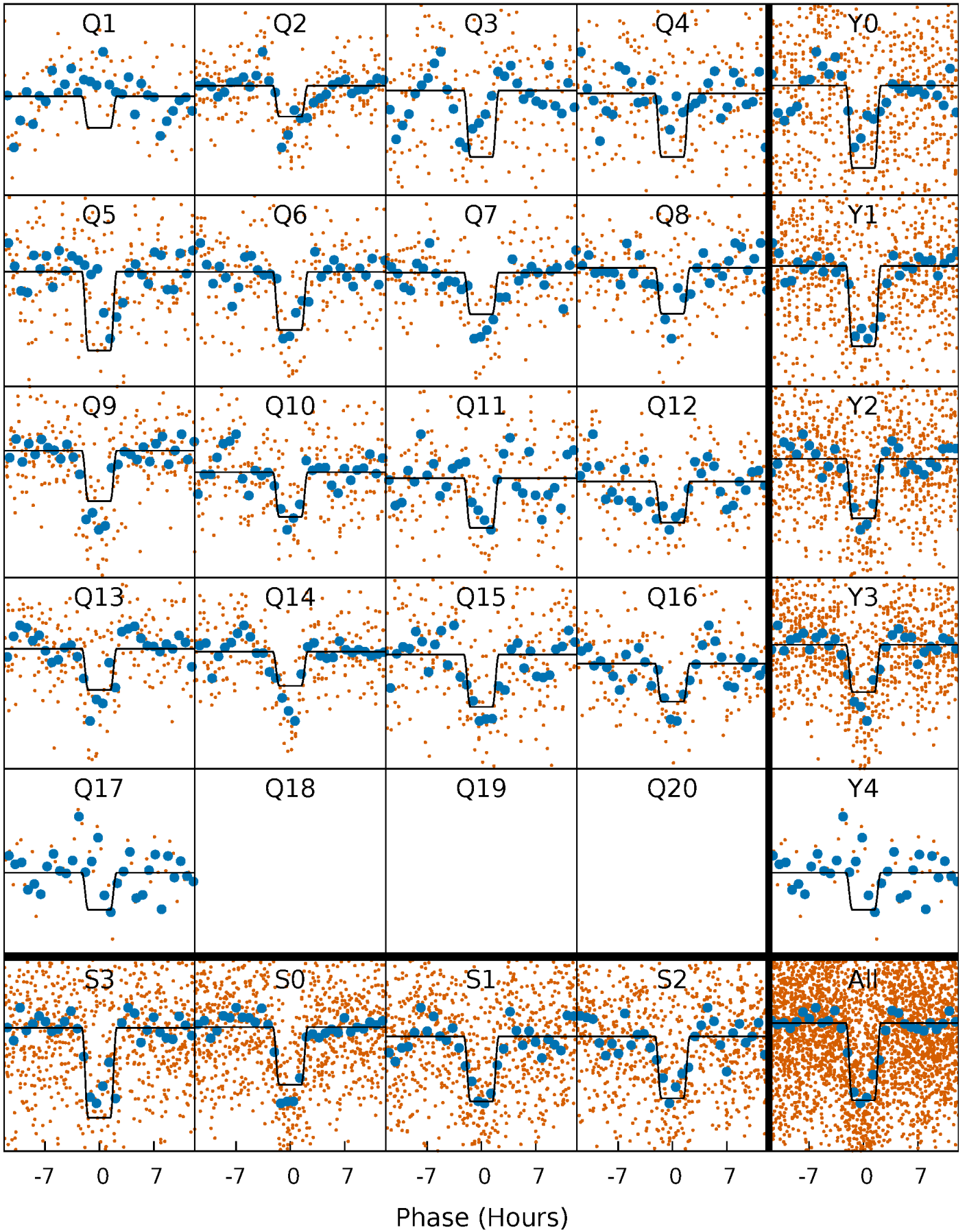
DV Quarter-Phased Transit Curves

TCE 004649440-02 P= 19.370599 Days $T_0=140.726846$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

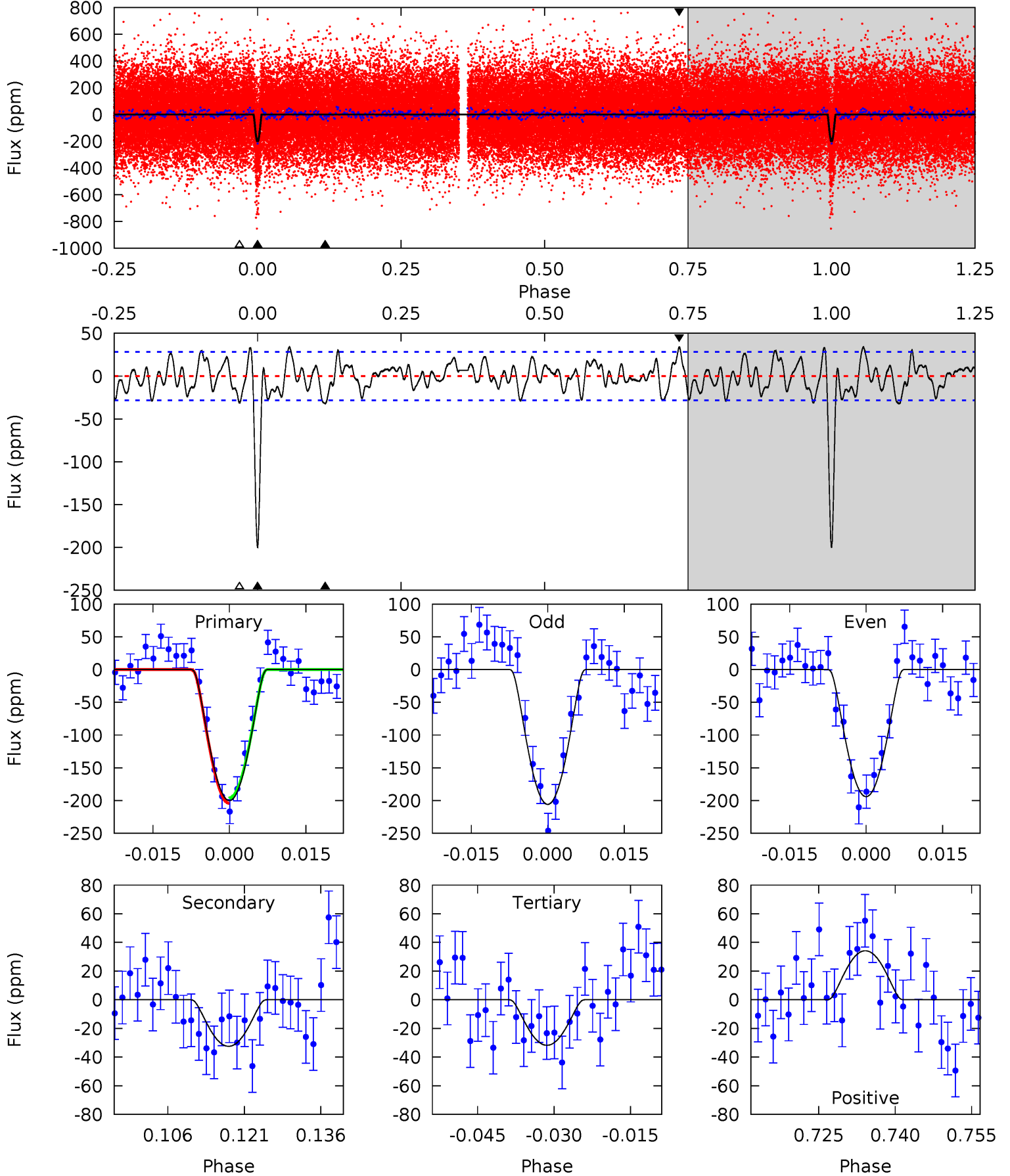
TCE 004649440-02 P= 19.370648 Days $T_0=140.726337$ (BKJD)



DV Model-Shift Uniqueness Test

004649440-02, P = 19.370599 Days, E = 121.356247 Days

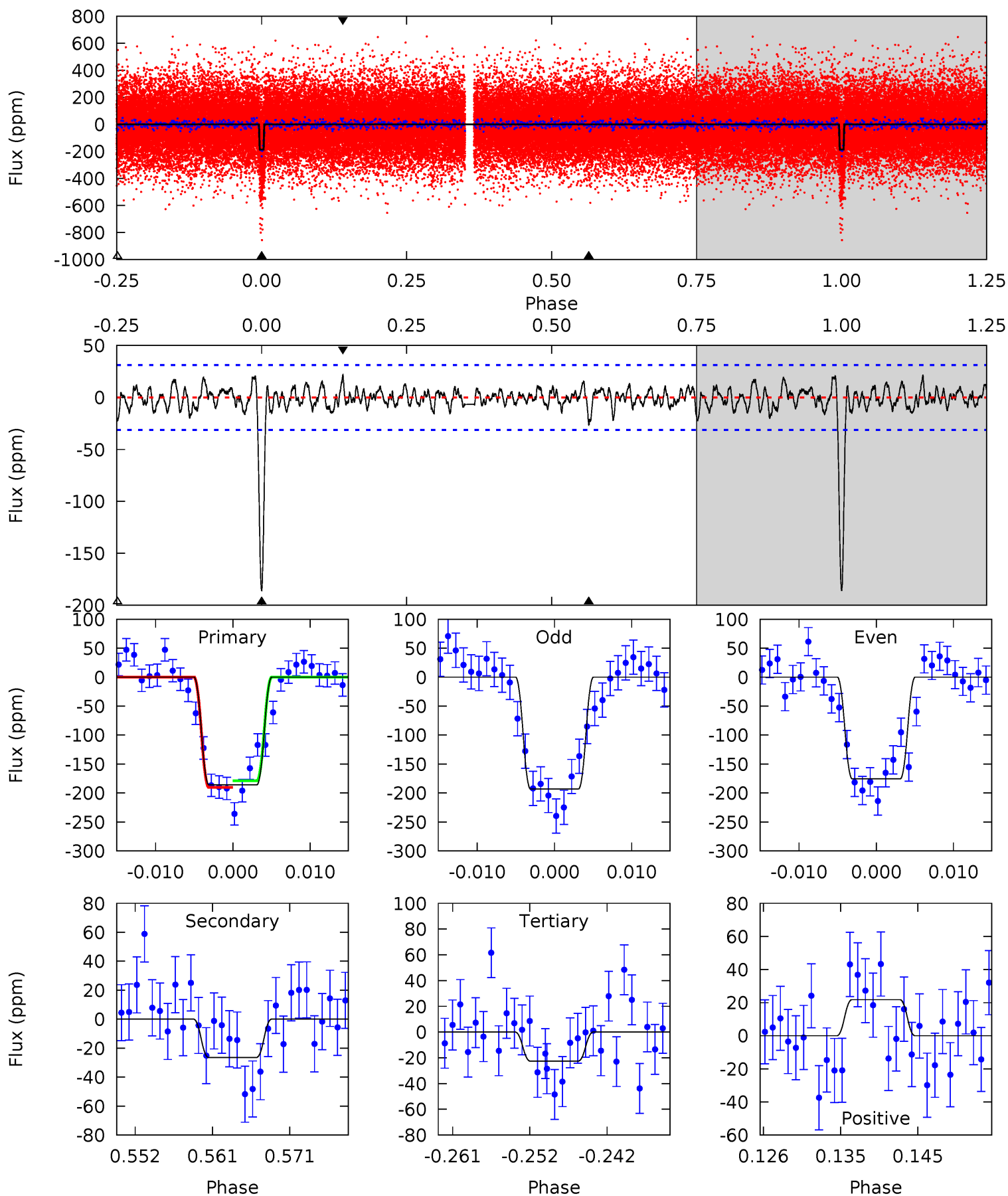
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
35.1	5.69	5.57	6.00	4.95	2.43	2.33	29.5	29.1	0.12	-0.31	1.03	0.97	0.15	0.73



Alt Model-Shift Uniqueness Test

004649440-02, P = 19.370648 Days, E = 121.355689 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.0	4.26	3.64	3.52	5.03	2.59	1.18	26.3	26.4	0.62	0.75	1.40	0.93	0.10	0.90



Stellar Parameters For KIC 004649440

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5321^{+130}_{-223}	$3.416^{+0.253}_{-0.136}$	$-0.100^{+0.200}_{-0.350}$	$4.335^{+0.692}_{-1.614}$	$1.783^{+0.177}_{-0.708}$	$0.031^{+0.054}_{-0.011}$
	+2%/-4%	+7%/-4%	+200%/-350%	+16%/-37%	+10%/-40%	+176%/-35%
Source	PHO1	FLK73	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 004649440-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-32 ± 6	$13.97^{+11.66}_{-8.69}$	1632^{+100}_{-148}	2866^{+1061}_{-471}	$2.532^{+16.415}_{-1.756}$
Alt.	-26 ± 6	$11.26^{+10.30}_{-7.78}$	1634^{+102}_{-128}	2999^{+1410}_{-563}	$3.330^{+28.097}_{-2.421}$

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

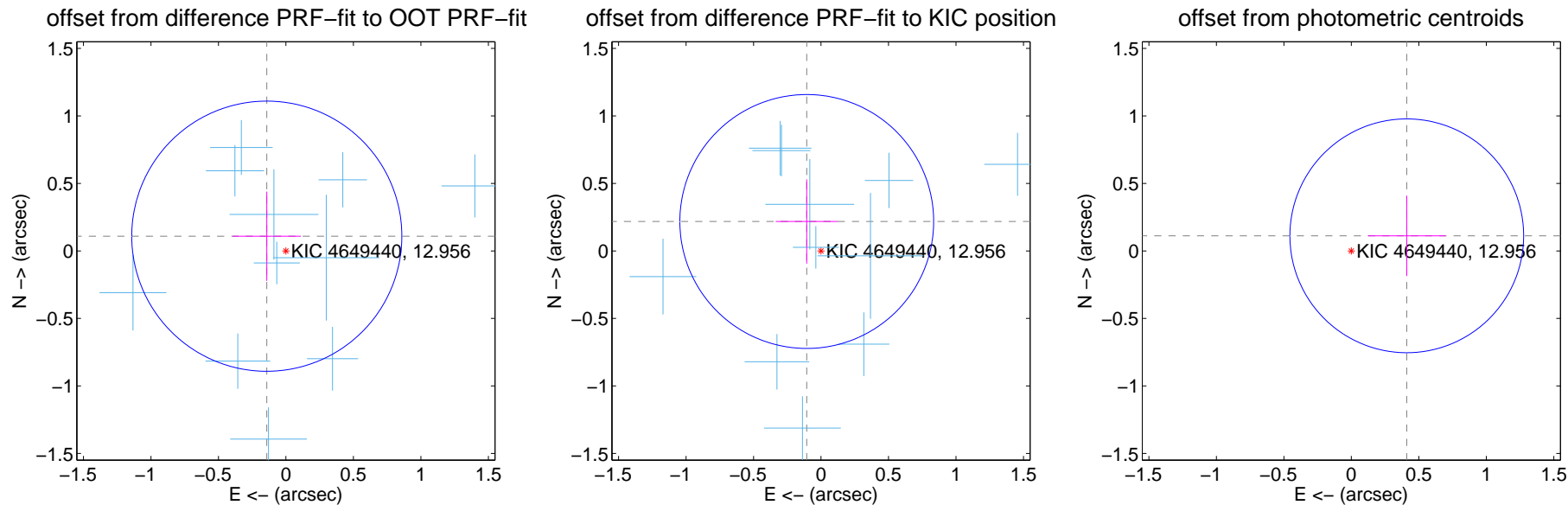
DV Centroid Data

Supplemental centroid analysis for 004649440-02. Kepler magnitude: 12.96. Transit SNR 14.04

There are 14 quarters with good PRF difference image offsets

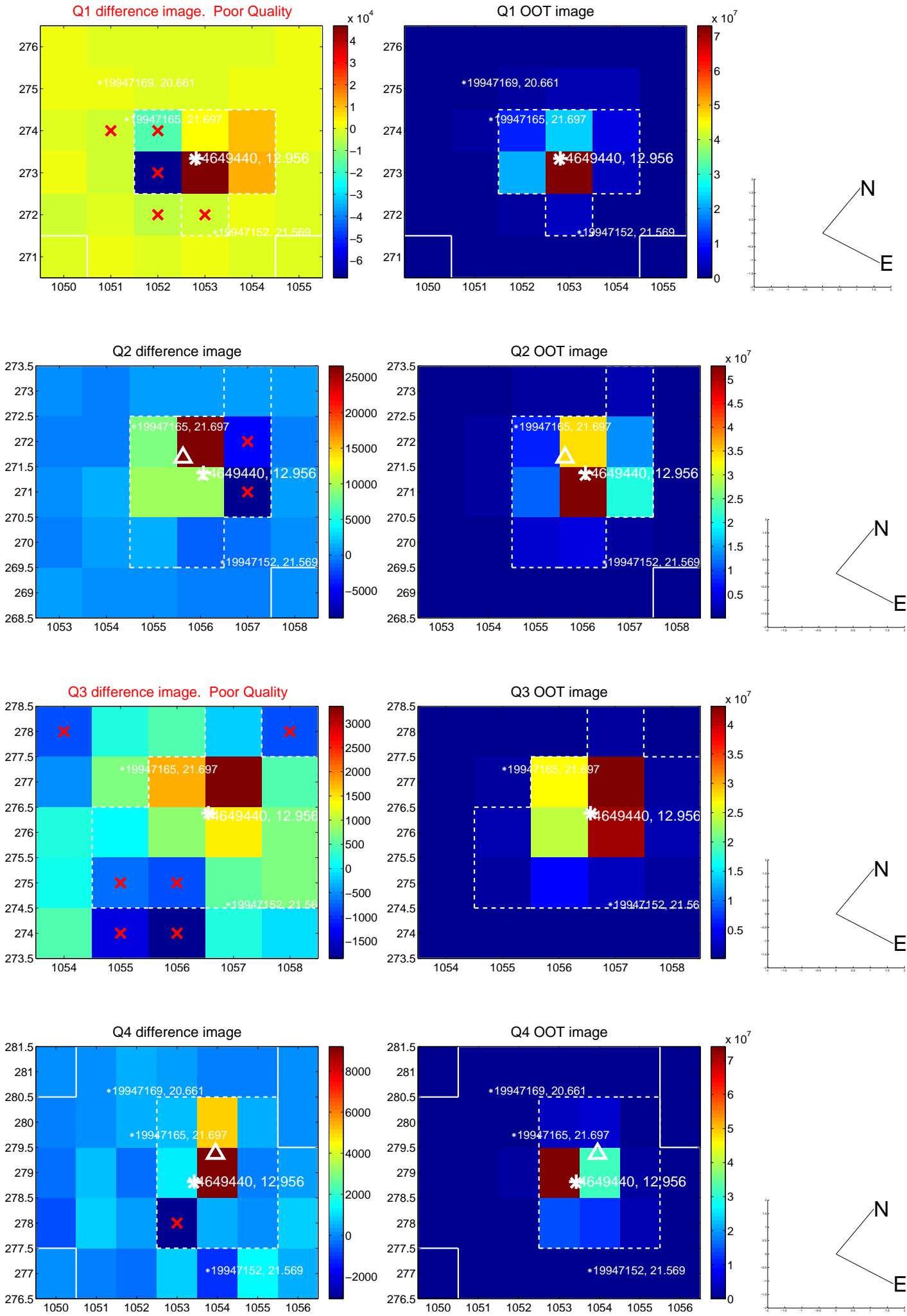
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.179 ± 0.334	0.54	0.142 ± 0.253	0.109 ± 0.331
PRF-fit source offset from KIC position	0.242 ± 0.313	0.77	0.106 ± 0.230	0.218 ± 0.312
photometric centroid source offset	0.43 ± 0.29	1.47	-0.41 ± 0.29	0.11 ± 0.30

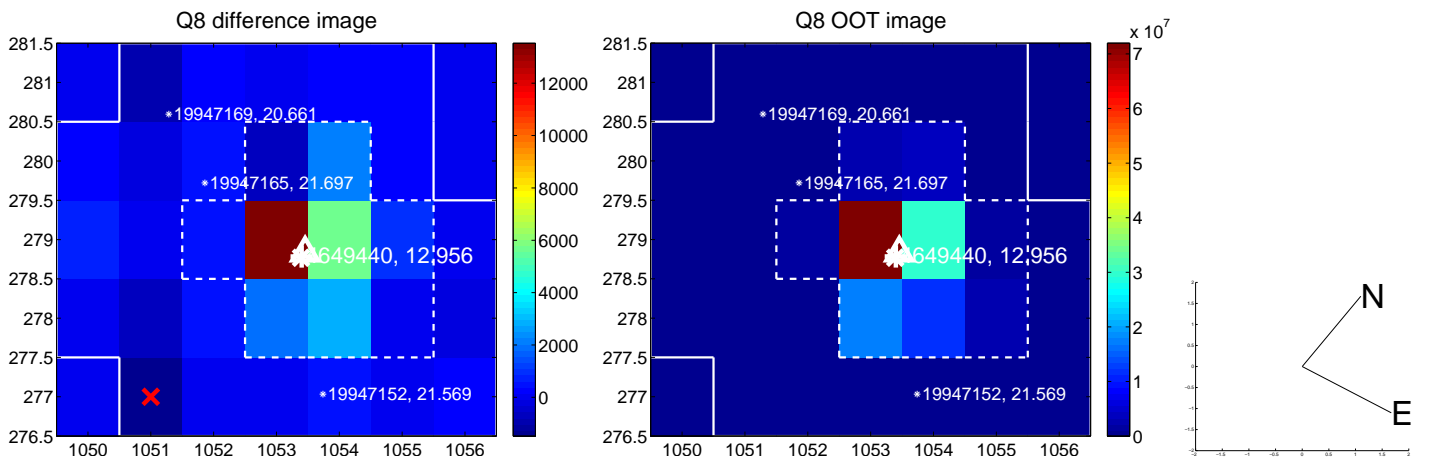
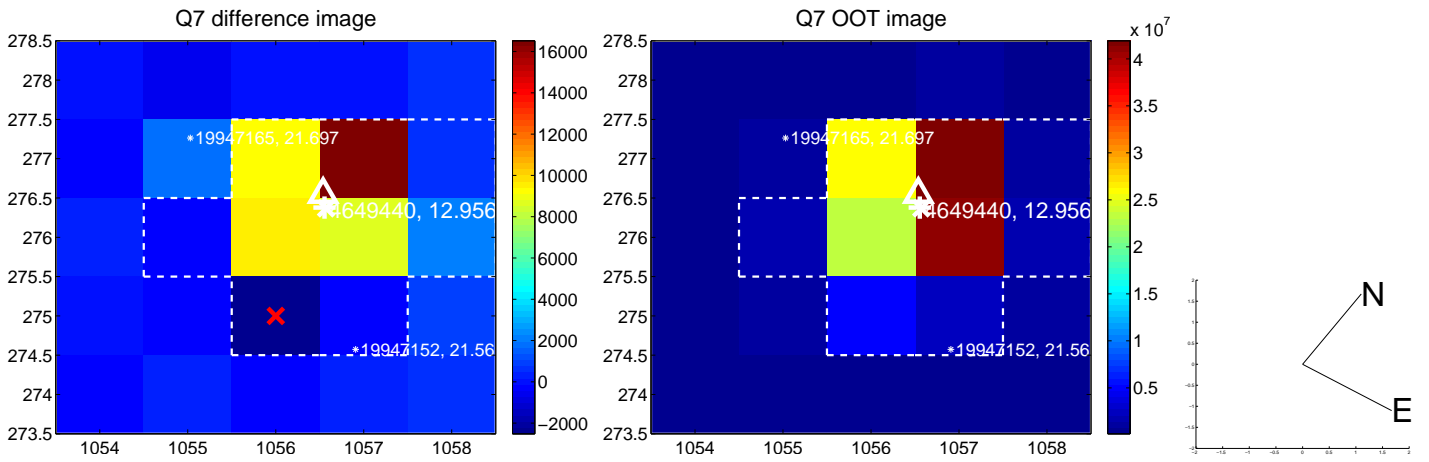
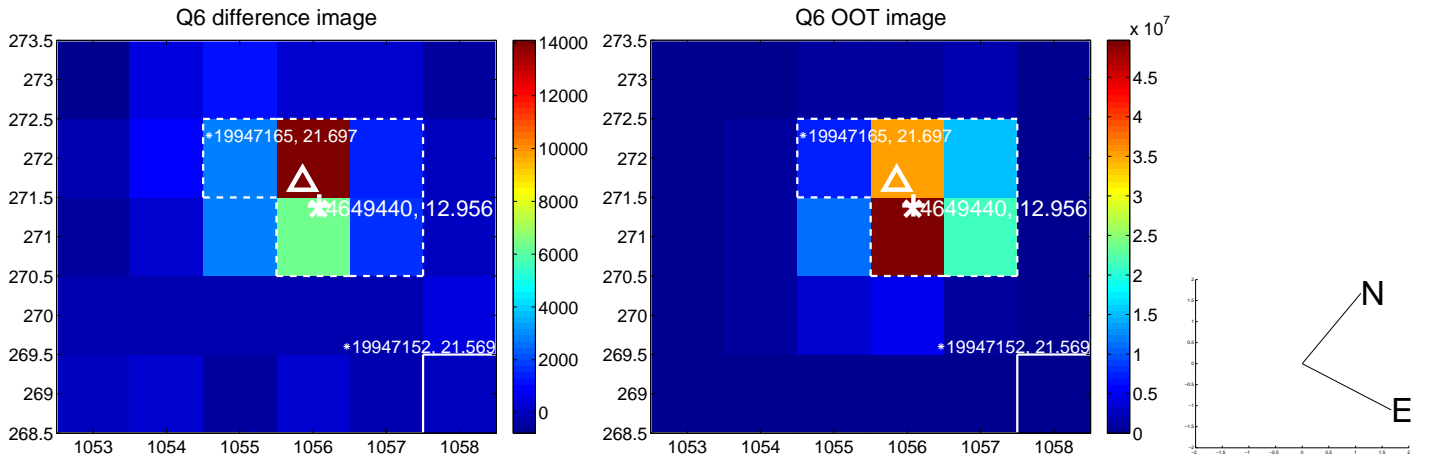
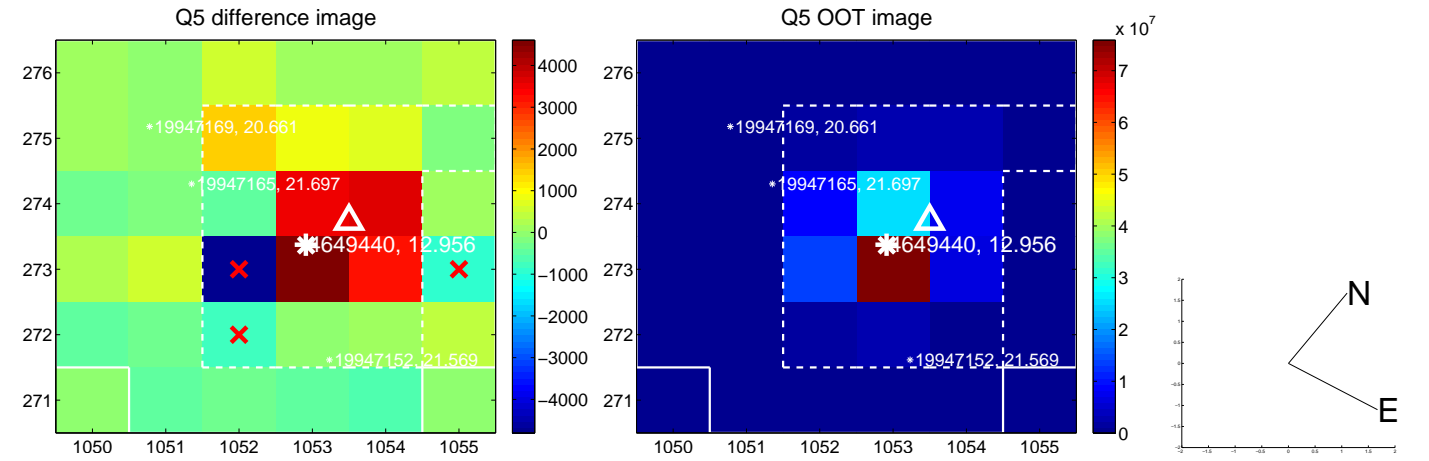


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

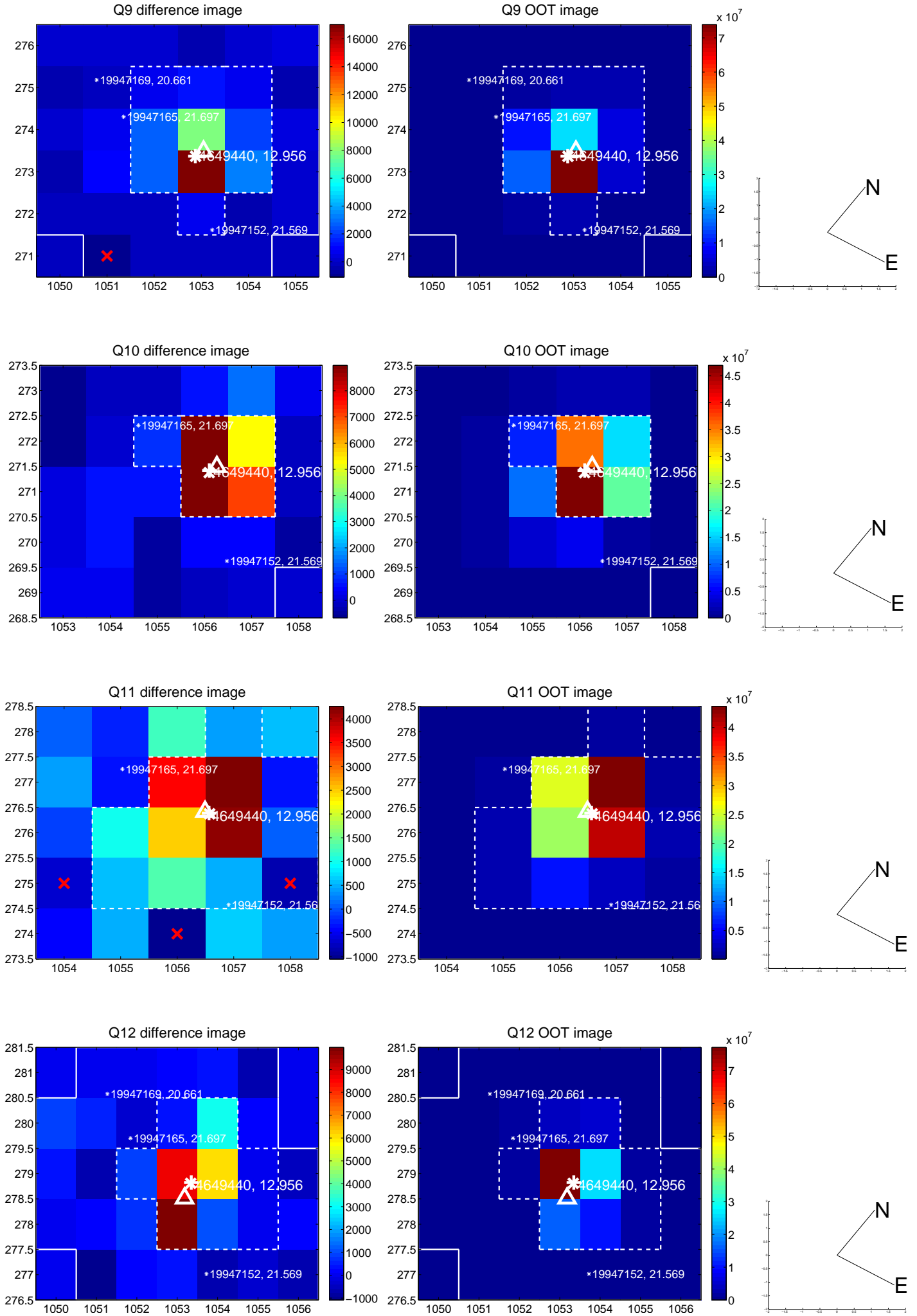
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



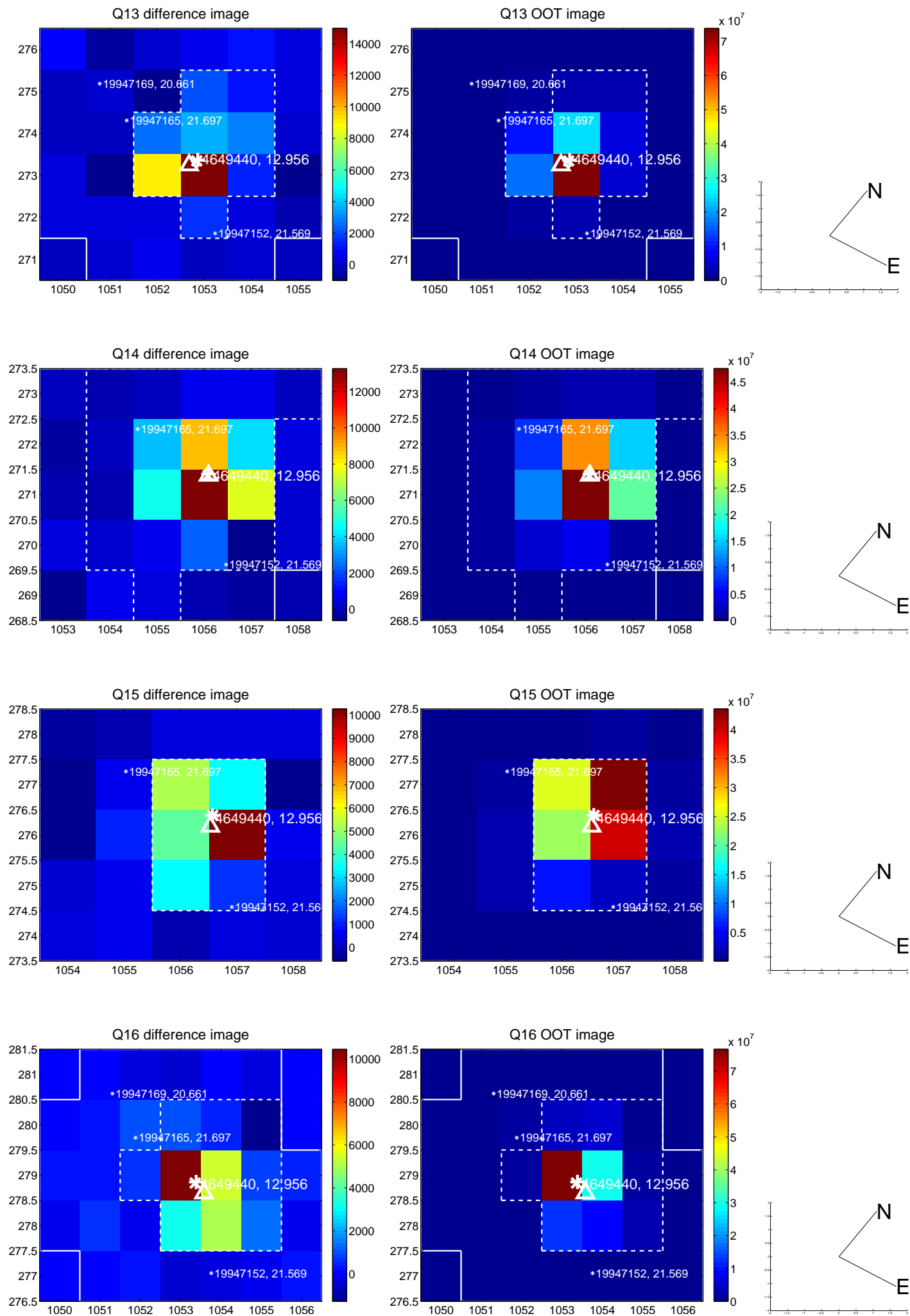
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



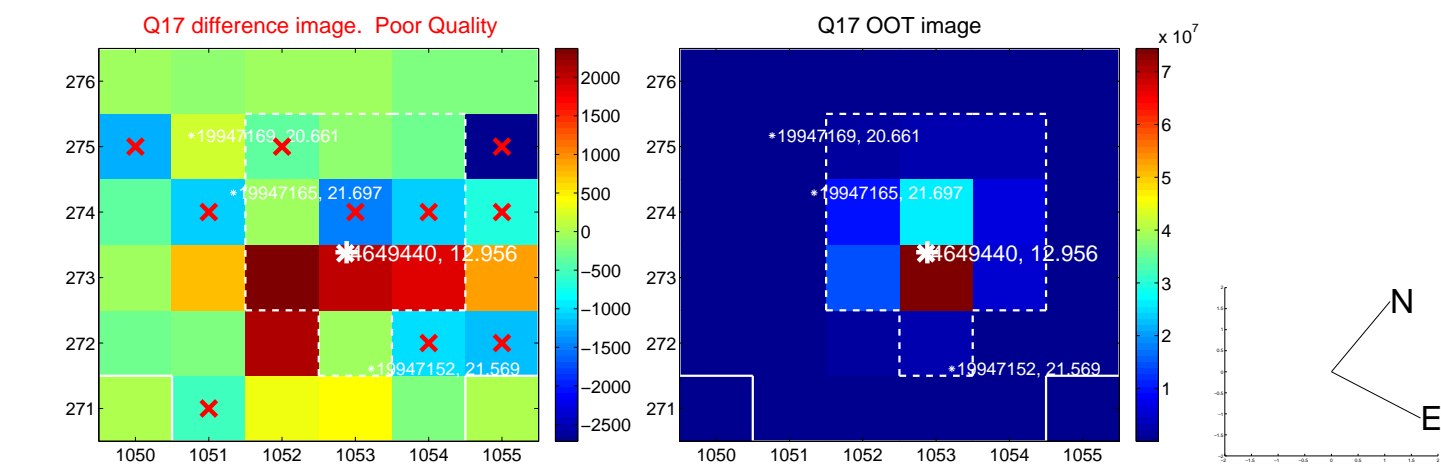
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



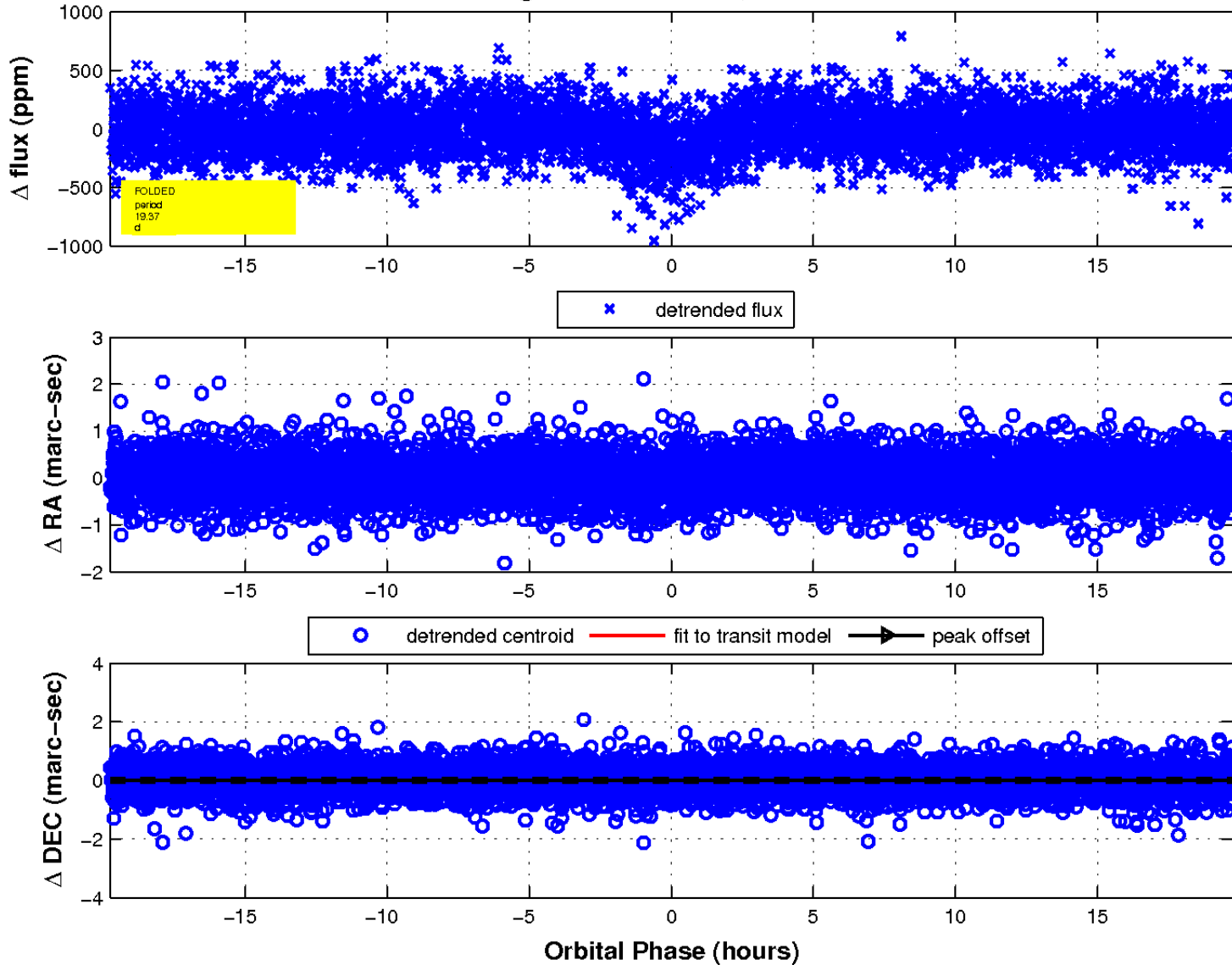
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

